BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 50] 1953 [No. 9

FIRST INTERNATIONAL SYMPOSIUM ON YAWS CONTROL

[*World Health Organization : Monograph Series No. 15*, iv+418 pp. 32 plates. 1953. Geneva: Palais des Nations. 22s. 6d.; $4.50; Fr.fr. 1,440; Sw.fr. 18.] *

A Review

by

C. J. Hackett, M.D., F.R.C.P.

[This symposium was so important an event in the history of yaws that Dr. Hackett was invited to review the published account of it at length. The published report contains much detailed information, and much discussion of important principles, and readers are strongly advised to consult the original.—Director.]

This Symposium was held in Bangkok in March 1952 and was organized by WHO and UNICEF. It marks an important stage in yaws control and the papers and discussions published in this monograph of the World Health Organization will make the study of earlier papers on yaws control largely unnecessary from a practical point of view. All this has arisen from the achievements and possibilities of depot penicillin (penicillin G in oil with 2 per cent. aluminium monostearate or, as it is named for short, PAM) in the control of yaws, together with the co-operation of international bodies such as WHO and UNICEF.

Eighteen of the 28 papers read at the Symposium are here published under 8 headings, together with brief reports of the discussions that followed each group.

Part I. *Biology of yaws*

Turner *et al.* deal with biological investigations on treponemes. Previous work had shown immunogenic differences between *Treponema pallida* and *T. pertenue* on the one hand and *T. cuniculi* of rabbits on the other, but no substantial differences had been shown between the first two. Recent strains of treponemes from syphilis, bejel and yaws were studied. In rabbits the treponemes of bejel appeared to be intermediate in character between

* Originally published in the *Bulletin WHO*, 1953, v. 8, Nos. 1, 2 & 3, 1–418. Sales agents for the United Kingdom, H.M. Stationery Office.

those of syphilis and yaws. In hamsters, however, yaws and bejel treponemes appeared to be more closely related. All strains of treponemes examined were found equally susceptible to penicillin. Penicillin resistance could not be induced in one strain of *T. pallidum* and has not been reported for any treponeme yet.

HILL, in a paper on the non-specific factors in the epidemiology of yaws, usefully summarizes present knowledge with particular reference to the Rockefeller studies in Jamaica in the 1930's. Yaws is a disease of backward rural communities in warm moist climates. Syphilis is rare in regions where yaws is endemic. After arsenical and bismuth treatment in Jamaica, infectious relapses were more frequent in treated infectious cases than in treated latent or non-infectious cases. The author is working on the use of gamma globulin from old yaws patients in active disease in children.

In the discussion trauma was considered partly to determine the site of infection, but although the question of insect vectors was raised it was felt that "Spread of disease occurred primarily through direct body contact with infected persons."

Part II. *Antibiotics in the treatment of yaws*

An important paper by LEVITAN and others from Haiti deals with the results following 2 ml. (600,000 units) PAM as a single injection given to patients with yaws, and 1 ml. (300,000 units) PAM to all members of their families "in order to avoid reinfection from family contacts who might be in the incubation stage." [The reviewer feels that the undoubted efficiency of this process depended on other members of the family being in a latent stage rather than in the incubation period.] Serological and dark-field examinations were made and patients were observed at monthly intervals as far as possible. In 636 patients only 4 relapses or reinfections were observed within 6 months; these had been treated with a preparation of PAM previously regarded as unsatisfactory. Among patients observed for longer than 6 months all of 9 with primary yaws gave serological reactions either "negative or significant drop in titre," 90·5 per cent. of 150 secondary yaws patients and 89·7 per cent. of 86 patients with "wet crabs" (papillomatous yaws of soles) gave similar satisfactory results. Numerous tables support this paper. [The results in 1953 of the campaign in Haiti are said to be extremely good.]

Then follow two papers on the time-dosage relation in penicillin therapy with special relation to yaws, (1) laboratory basis for effective therapy by KITCHEN & REIN, and (2) clinical basis for effective therapy by REIN & KITCHEN. In the first are described the basic studies undertaken to devise a preparation with a sufficient repository action to obviate the necessity for frequent injections. Later marked variations in chemical, physical and repository characteristics were noted in PAM preparations from different sources. The need is stressed for definite specifications for penicillin preparations; specifications for PAM have been recommended by the WHO Expert Committee concerned. In the second paper it is noted that the serological response of yaws to penicillin is slow, probably because the yaws has usually been present for some time. Results are discussed of treatment with penicillin G in peanut oil containing 4·8 per cent. beeswax, in dosage sufficient to ensure the maintenance of an adequate therapeutic level for 96 hours. The most favourable results after 12 months (94·4 per cent. serological cure or improvement) followed 2·4 mega (million) units in 8 injections of 300,000 units in 4 days; but half that total dosage in 2 days gave 90·7 per cent. of satisfactory results. In venereal syphilis in New York the authors found that, for good results, a single injection of PAM 1·2 mega units was

required in primary syphilis and 2·4 mega units in secondary syphilis. They feel that in treponematosis "adequate treatment in a single injection is possible without fear of untoward reactions."

HILL deals with antibiotics other than penicillin in the treatment of yaws and concludes that at present none can replace penicillin in mass treatment.

In the discussion most participants agreed that 1·2 to 1·8 mega units PAM was the dose most likely to produce best all-round results, and a single injection had great administrative advantages.

Part III. *Extent and nature of the yaws problem*

This aspect in Africa was dealt with by HACKETT, and in addition to attempting to summarize the present position on the basis of replies to a questionary circulated throughout Africa in 1951 he gives the first published account of an outbreak of yaws in a deep mine (Springs Mine) in South Africa in 1942. In this outbreak direct skin contact appeared to be an essential in transmission, which occurred only in the "tropical" conditions in the depths of the mine and not in the more temperate conditions of the surface. In Africa yaws incidence appears to be highest in the warm humid area between 10°N. and 10°S. of the Equator, with much lower incidences in the next 10° N. and S. of that zone. On the outer borders of this area of lower incidence there were suggestions that endemic syphilis might occur. VAUCEL completes this survey of Africa by dealing with yaws in the French African territories. Yaws is found among under-developed peoples with a low standard of living. Vaucel reports that in African territories yaws and syphilis can occur together, and that the economic loss due to yaws is low. Despite the effectiveness of treatment, yaws incidence in French territories is falling only slowly, since present measures do not reach the total reservoir of infection; only the adoption of public health measures in endemic areas can eliminate yaws.

In the discussion are included maps of the distribution of yaws in Africa and in the world. One participant epigrammatically stated that "yaws occurs at the end of the road," that is, where the developments that produce and follow roads stop.

Part IV. *Development of plans of operation*

JUNGALWALLA deals with planning for yaws control in South-East Asia and stresses the need to train and employ non-medical persons, and for the campaign to fit into the public health service of the country after the initial activity has achieved its purpose. This paper contains much useful information for anyone planning a campaign.

A very useful paper on yaws in Brazil by F. Nery GUIMARÃES contains much information about his own work in the State of Rio de Janeiro. It would appear that yaws was brought to Brazil by the slave trade. Among over 1,000 patients the following percentage incidences occurred: primary 3·7, primo-secondary 18·3, secondary 49·0 and tertiary 29·0. Framboesomas, that is characteristic secondary skin lesions, were present in 53·7 per cent. of patients and plantar hyperkeratosis in 63·5. Over 70 per cent. of patients had difficulty in walking and working in the fields. Patients were recognized by house-to-house visits by carefully selected local residents continuously on the look out for patients, who are brought to a temporary centre and retained there during the period of treatment. The areas from which cases came were carefully observed until neither new cases nor relapses occurred. Two injections of 10,000–15,000 units penicillin were given daily for 10 days (total 100,000–300,000 according to age). In

primary and secondary yaws 93 per cent. of clinical cures and 70 per cent. of serological reversals were obtained. The author points out the failure of past efforts to control yaws by treatment and considers the increased expense of his method justified by the results. [The reviewer has visited this area, in which the population is very scattered, with F. N. Guimarães and would support his claim for its effectiveness.] He considers that relapses due to inadequate treatment are the most important causes of failure in past mass treatment campaigns. [To these the reviewer would add relapses of cases in the latent stage at the time of mass treatment.]

In the discussion it was stressed that selected lay people in yaws areas can readily be trained to carry out the work of mass diagnosis and treatment under experienced medical supervision. Asymptomatic household contacts should be treated and an organization established to recognize and treat infectious cases that might appear after the campaign. Such campaigns should, with the present limitation of resources, be largely confined to yaws alone.

Part V. *Demonstration, survey and training phase*

Rein deals with diagnostic aids in mass treatment campaigns against yaws and points out that where yaws incidence is high mass treatment may be undertaken without serological examinations, but where the incidence is low they are necessary. He discusses the occurrence of false positive reactions in other diseases likely to be met in the tropics; the use of cardiolipin antigens has reduced these.

In the discussion it was agreed that suitably trained non-medical persons are fully competent to carry out anti-yaws field work. [This is a very important and practical issue.] Reference is made to a classification of the lesions of yaws for use in the field. This was as follows:—

1. Initial lesions
2. Multiple papillomata
3. "Wet crab" yaws
4. Other early skin lesions
5. Hyperkeratosis

6a. Gummata and ulcers
6b. Gangosa (rhinopharyngitis mutilans)

7. Bone and joint lesions
8. Latent yaws
9. Other manifestations.

At the end of the monograph are reproduced 32 photographs to illustrate this classification. [The reviewer feels that this classification is not entirely satisfactory from the point of view of yaws control since although No. 1–4 are potentially dangerous as regards transmission and No. 6a and 6b are potentially safe, No. 5, 7, 8 do not recognize that some of such patients may suffer infectious—and thus, from the public health point of view—dangerous relapses. However, this classification is a useful forward step.]

Part VI. *Expansion phase*

A paper by Petrus and others deals with the anti-yaws campaign in Haiti, the results of which are of great value to all concerned with yaws control. This short paper should be studied in the original. House-to-house search for yaws patients in a scattered, relatively inaccessible, population was made by inspectors who work in the evenings and on Saturdays (this is important for finding patients) and, in addition to patients, contacts with patients were treated. Patients, that is those with

yaws lesions, were given 2 ml. (600,000 units) PAM and their contacts half that dose. [At a discussion held at Ubol in north-east Thailand, during the visit to see field work, that followed the Bangkok Symposium, it appeared that all persons in Haiti who had yaws lesions or said that they had had yaws were "patients" and all others were "contacts." The reviewer would suggest that as this last group would include all the latent cases their treatment in this way might have largely contributed to the success of the campaign.] From 20 July 1950 to 31 October 1951, 642,238 persons were treated, and from 27 October 1951 to 31 May 1952, 358,999 were treated. The population of Haiti is about 3,000,000. The authors conclude that after the campaign small foci of yaws will remain in the island and that to complete eradication diagnostic and treatment centres must be established in strategic points for "eradication in the true sense of the word is the result of a continuous effort, a work of time."

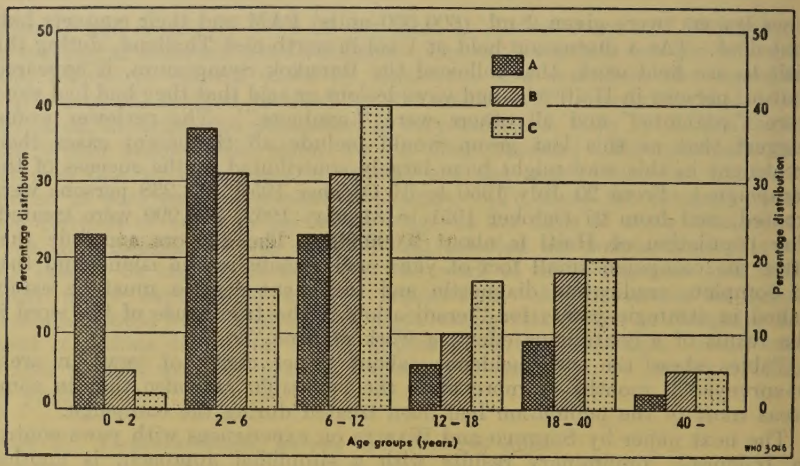
Tables show the low incidence (about 1 per cent.) of yaws in areas re-surveyed 5 months or more after the campaign and also that in some areas most of the population had been treated during the campaign.

The next paper by Soetopo and Wasito on experiences with yaws control in Indonesia, preliminary results with a simplified approach, is another important record of field work. It is based upon the established sub-district polyclinics and their staffs of a trained nurse or *mantri* and his assistant or *djuru-patek*, after 4 weeks' training in yaws control methods. This they have named the TCPS (Treponematoses-Control Project, Simplified). It developed from the original method of Kodijat, the doyen of yaws control in Indonesia. The survey is carried out in the village by the *djuru-patek* and the injections are given by the trained nurse in the polyclinic. Five months after such mass treatment a further survey by the authors showed that over 90 per cent. of patients were clinically cured and the remainder were about equally improved or not improved. Reinfection or relapse was less than 1 per cent. Two injections each of 4 ml. (1·2 mega units) PAM were given. Over 90 per cent. of the population were clinically examined at the campaign itself and at the survey 5 months later. The authors stress that the results depend on the level of attendance for examination. A serological re-survey of those over 10 years of age showed that 7·5 per cent. of the reactions were negative, 58 per cent. had improved and 32·8 per cent. were unaltered. The irregular incidence of yaws was observed.

The authors studied the incidence of infectious yaws lesions in age groups related to activity as follows:—

Age (years)	Period	Type of contact
under 2	baby	household
2–6	"toddler"	household and hamlet (neighbourhood)
6–12	school-age	household, school, hamlet, and village
12–18	adolescent	household, hamlet, and village
18 and over	adult	predominantly household; as people grow older outdoor contact gradually decreases and household contact becomes more intensive.

Their Fig. 2, reproduced here on p. 780, shows the high incidence of infectious lesions in patients under 12 years of age. Primary lesions were most frequent under the age of 6 years. The importance of outdoor and school contacts is discussed. Yaws in Java occurs in rural areas with a peasant population where sanitary conditions are poor and where there is great poverty and the constant threat of famine. Some areas are on limestone



A = Primary lesions (95 cases)
B = Papillomata (1,526 cases)
C = Palmar and plantar papillomata (794 cases)

[Reproduced from *World Health Organization: Monograph Series No.* 15.]

Prevalence of infectious yaws lesions according to age.

and marl with very dry soil during the eastern monsoon, and very sparse vegetation, and have an average annual rainfall of 40–50 inches (1,000–1,250 mm.). "Neither the geological formation nor the humidity of the soil gives a satisfactory explanation of the prevalence of yaws in regions of Java."

A yaws team of 6 qualified nurses can handle 6,000 persons in 4 weeks. The *djuru-patek* can handle approximately 3,700 in the same time. The average attendance of the population for mass survey is 87·55 per cent. [The census and the collecting of the population at some prearranged locality is the responsibility of the village civil authorities. The reviewer was impressed with the accuracy and thoroughness of this and all other aspects of the anti-yaws work that he saw in Java in 1952.] House-to-house examination is not a routine procedure in Java. The authors stress the importance of the "big group of latent cases that requires the most attention." They suggest that all in the school-age or "toddler" period with a history of having had yaws should receive treatment, and that all older folk who had contracted yaws within the previous 5 years should also be treated. In one re-survey, over 5 months after the campaign, the incidence of yaws had fallen from 16 to 5 per cent. "For the most part the cases found during the re-survey were either latent cases which were examined during the initial survey but had no symptoms at that time, or persons who were not examined during the initial survey and were found to have yaws during the re-survey." In the discussion it was stated that a study in Indonesia indicated that one-third of the total new cases found at re-surveys were contacts of infectious yaws and that another third were from a much larger population group which was not exposed to family risk.

Part VII. *Consolidation phase*

A paper by Hackett on this aspect of yaws control (that is its integration into the established public health services) in Africa attempts to

summarize the present position. It emphasizes the important work of HARDING [this *Bulletin*, 1949, v. 46, 549] and his insistence that mass treatment, rural dispensaries and house visits to control the appearance of further infectious cases, from whatever cause, are essential for success. [These cannot be over-emphasized.] Attention is called to the experiences in the Springs Mines yaws outbreak in 1942; although all the miners (400) at risk were examined naked every 14 days and all with yaws were isolated and treated until non-infectious, it was not until 15 months after the first case was recognized that the last case occurred!

CRUZ deals with the integration of yaws control into the permanent health stucture of the Philippines. It is proposed to use this anti-yaws campaign to assist in educating the public in personal hygiene and community sanitation "since the control of yaws has considerable popular appeal." The campaign will be organized on a block system of about 100 houses; treatment comprises two injections of PAM at an interval of 4 days.

Then follows an important paper by TROUPIN, REYNOLDS and GUTHE on yaws control as an opportunity for promoting rural health services, which crystallizes the teachings of HARDING and other experienced field workers that an anti-yaws campaign must be the means of developing rural health services and not an end in itself. They stress the importance of planning in public health work and this planning must rest with the national or local government; an international body, such as WHO, should mainly provide persons who can offer advice and technical aid. The characteristics of a good plan are:

(1) it "outlines a series of limited objectives consistent with, and leading to, a stated general purpose, and indicates the gradual course of action";

(2) it "should be thoroughly understood at all levels, and those who participate in the programme should share in its preparation";

(3) it "is realistic and provides for maximum use of facilities, both existing and envisaged";

(4) it "is flexible and capable of revision."

The authors conclude that the soundest method of avoiding the catastrophe of the rapid reappearance of yaws after premature cessation of anti-yaws activities is to build into and around the yaws-control programme progressively better rural health services.

The discussion revealed that the period elapsing between mass treatment, when maximum coverage had not been achieved, and re-survey should be 3–6 months.

Part VIII. *Rôle of international organizations*

The rôle of WHO in yaws control is dealt with by BONNE, GUTHE and REYNOLDS. They outline a five-phase approach to yaws control as follows:—

(a) orientation and preliminary analysis of the problem;
(b) development of methods;
(c) demonstration, survey and training;
(d) expansion;
(e) consolidation.

Although WHO may be of help in all these phases it is in (c) that it "can be most useful to governments that desire to bring yaws under better control." "At no time, however, do the contributions of the Organization exceed those of the country concerned." WHO can stimulate; it can assist; it can support; "but there can be no substitute for active work by governments, both national and local, towards the solution of their own

health problems." [A country successfully carrying out any large-scale public health measure gains great international prestige (for example, Brazil and *A. gambiae* eradication) which also serves as a stimulus for further national effort, for nothing succeeds like success!]

The rôle of the UNICEF in yaws control is dealt with by KEENY. From May 1950 to March 1952 in the Indonesian campaign, 328,000 patients had been treated at a total cost of $2.50 per patient, of which UNICEF and the Indonesian Government contributed about half each (at this time PAM cost $1.38 per vial of 10 ml. or 3 mega units). Costs for the more recent period were expected to be less. He discussed a proposal for a 10-year yaws control project in Indonesia where there are probably over 7½ million cases. It is hoped to treat a million cases a year. Simplified methods may achieve this. It is estimated that in Indonesia, Thailand and the Philippines, by the end of 1952, 6 million persons will have been examined and 800,000 yaws patients diagnosed and treated.

The final discussion raised the question of the effect on population density of public health measures and it is felt that if yaws is controlled workers in agriculture will become more efficient and that successful campaigns should thus have a far-reaching effect on the economic development of vast areas of the world. [Since yaws is not an important cause of death its eradication will produce more healthy people without at the same time greatly increasing the number of mouths.]

The monograph ends with 32 photographs of yaws lesions, taken in Lira, Uganda, in 1937–39, to illustrate the classification to which reference has already been made.

[This is one of the major publications on yaws and should be studied by all concerned with preventive medicine in areas where yaws is endemic and by all responsible for yaws control measures. The Symposium should come to mark a new era in tropical rural health which has been initiated by the effective co-operation of national and international activities.

It might be worth calling attention to the slight confusion that has occurred in the captions of Figs. 31 and 32 on pages 417 and 418. Fig. 31 is of prepatellar bursitis and Fig. 32 is of juxta-articular nodules in the olecranon region.]

SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS

(Continued from p. 671)

NEMATODES

General

Some unusual nematode infections in Israel are recorded by WITENBERG (p. 522).

JAQUES (p. 979) suggests that sarcoidosis may be a response to nematode larvae, quoting a case in which this appeared to be so.

---

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1952, v. 49. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Hookworm Infection, Strongyloides, etc.

DE MAGISTRIS (p. 163) comments on the hookworm infection which is found in peasants near Naples, and BELLONI and MUZZOLINI (p. 163) report cases from the neighbourhood of Padua.

ARORA (p. 422) studied cases of (usually severe) hookworm disease in India, the main clinical features being anaemia (of iron-deficiency type usually, but occasionally macrocytic), oedema, cardiac dilatation, splenomegaly and low blood pressure. Neither the degree of anaemia nor the severity of the symptoms could be correlated with the hookworm load.

In children DA COSTA *et al.* (p. 706) found hexylresorcinol useful for hookworm and *Trichuris* infection, but somewhat less consistently so (though still effective to some extent) in ascariasis. It was given as dragées or in gelatin capsules. WILSON (p. 1140) used stibanose for creeping eruption due to *A. braziliense*, as a 2 per cent. solution intramuscularly. Results were moderate and lesions remaining were treated by freezing and with ethyl acetate collodion.

The association between *Strongyloides* and creeping eruption in returned prisoners-of-war from the Far East, has been studied by SANDOSHAM, (p. 786), who thinks that the species *stercoralis* was involved. *Strongyloides* infection is common in São Paulo, Brazil, where COUTINHO *et al.* (p. 977) found 12·07 per cent. of children infected. A patient with strongyloidiasis, and ascites and enlargement of the liver, is described by GOLDBERG and LYMBURNER (p. 284). He was treated with gentian violet, apparently with success.

CORRÊA (p. 528) writes on the presence of eggs of the family Trichostrongylidae in human faeces, noting that *Trichostrongylus* spp. have been found especially in the Far East.

Ascaris

Ascaris infection is not uncommon in the schoolchildren of a town of N. Italy; VERNA (p. 633) discusses the factors influencing the incidence of this infection there.

DE SILVA (p. 165) states that *Ascaris* was present in about half of his child patients in the country districts of Ceylon, and describes 4 groups according to the symptoms and signs displayed. Some of the patients are toxic, with high fever, and the condition may be fatal. He discusses treatment. High incidence rates of *Ascaris* and hookworm are recorded by RITCHIE *et al.* (p. 523) from part of Japan; they also comment on the unusual incidence of *Trichostrongylus* infection (38·4 per cent.). Investigations made in Japan showed that *Ascaris* eggs could be found very easily in field soil, dust in laboratories, public vehicles and houses, in puddle water and water from fields, on vegetables (especially leafy vegetables) and on the fingers of children. FUEKI (p. 1060) thinks that human infection occurs most frequently in spring and autumn, when certain vegetables are being marketed, to be eaten uncooked. NISHIMURA (p. 1139), however, shows that *Ascaris* eggs kept in dry dust died in about 10 days under Japanese conditions, but if kept in wet dust many of them completed their development in 13–15 days, though they died soon after. Eggs on floors which are swept every day rarely become mature, therefore, and only occasionally can they cause infection.

Points in the examination of sewage for eggs of *Ascaris* are discussed by BLAAS and PFEUFFER (p. 423), who point out that sewage is not a homogeneous liquid, and that discrepancies may for this reason occur in egg counts.

An encapsulated larva of *Ascaris* was found by BEAUTYMAN and WOOLF (p. 529) in the thalamus of a child who died of poliomyelitis. There was histological evidence of migration of larvae through the cerebral vessels. INNES and SHOHO (p. 1137) write on the possible association between insect-borne nematodes and viruses in relation to disease of the nervous system, drawing their material chiefly from animal infections.

The surgical aspects of ascariasis are discussed by DESA (p. 978) on the basis of 49 cases of intestinal obstruction or peritonitis with and without perforation. Embryonated eggs of *Ascaris* were found by COORAY (p. 164) in the wall of a hernial sac removed at operation. The possible routes by which the eggs arrived there are discussed. CORCOS *et al.* (p. 164) report a case in which an *Ascaris* perforated the intestine, causing peritonitis. DIETHELM *et al.* (p. 978) found *Ascaris* infection in a high proportion of patients with necrotic enteritis, and they surmise that this association may be linked with allergic changes which may be produced by the worms.

In treatment, CORCOS *et al.* (p. 284) found hetrazan useful in ascariasis but not so successful in hookworm infection. NOR EL-DIN (p. 636) also writes favourably of hetrazan for *Ascaris* infection; he considers it the drug of choice. LOUGHLIN *et al.* (p. 424) gave hetrazan in doses of 13 mgm. per kgm. daily for 3–4 days, or 13 mgm. per kgm. for 1 day followed by 20 mgm. per kgm. for 2 days, in the treatment of ascariasis. They used a syrup preparation, and report good results from a single administration each day. There was almost complete freedom from toxicity. The drug did not influence egg counts of various other nematode and cestode intestinal worms. HOEKENGA (p. 425), however, with hetrazan not in syrup form, did not obtain such good results, especially with small doses, though a total dose of 1·8 gm. spread over 3 days (equivalent to about 13·6 mgm. per kgm. daily) cured 9 of 15 patients (mostly adults). He (p. 1139) later used a syrup preparation and found that a dose of 12 mgm. per lb. (about 27 mgm. per kgm.) daily for 4 days produced good results. Higher doses tended to be toxic. The few results quoted by ROMAÑA *et al.* (p. 426) do not seem to be very encouraging.

TAKEYAMA (p. 286) and NAGAI (pp. 286, 287) have made investigations on the effect of anthelmintics on egg production of human and pig ascarids, and FUSHIMI (p. 288) reports certain differences between human and pig ascarids. TAKATA (p. 423) reports successful infection of several human volunteers with eggs of *A. lumbricoides* from the pig, apparently for the first time. He thinks that human and pig species of this worm are physiologically distinct. VAUGHN (p. 638) has shown that extracts of *Ascaris suum* possess the property of stimulating eosinophilia. STUDER and FUST (p. 637) have investigated the effect of cortisone in reducing tissue eosinophilia and blood eosinophilia in guineapigs sensitized to extract of *Ascaris*.

The migration of larvae of various ascarids in mice has been studied by SPRENT (p. 786).

JETTMAR and EXNER (p. 787) tested various chemicals against eggs of *Ascaris megalocephala*; details should be sought in the original.

Filarial Infections

Wuchereria bancrofti.—

RAGHAVAN (p. 708) states that in Porbandar (Bombay) *W. bancrofti* infection is highly endemic, the sole vector being *Culex fatigans*, which finds ideal breeding places in soakage pits near human habitations.

CANET (p. 1063) writes on *W. bancrofti* infection in south Indo-China, where it is particularly common in the high plateaux of Annam and on

mountain ridges. The form is nocturnal and the vector appears to be *C. fatigans*. There is no evidence that *W. malayi* exists in Cochin-China.

In a district of Surinam the incidence of *W. bancrofti* infection was 13·7 per cent. BLUMBERG *et al.* (p. 979) show that the rate rose sharply in persons aged 6–15, and was highest in Creoles (18·5 per cent.). The reason for this is not clear. Similarly LAMPE (p. 68) comments on the fact that although in Surinam exposure to infection with *W. bancrofti* is enough to give a microfilaria rate of about 30 per cent., continuing exposure in subsequent decades leads to little further increase. He postulates some factor which prevents development of the worms in 70 per cent. of the people; possibly some form of antibody. He describes a skin test with an antigen from dried *D. immitis* which was apparently specific for filariasis in the sense that positive results were not given in *Ascaris* infection; there was, however, too great an overlap of reactions which might be read as positive, occurring in known uninfected persons, for the test to be useful in diagnosis. *Mansonella ozzardi* is common in the interior, and probably all adult Indians there have been infected (according to skin tests) although many may show no symptoms or parasites. Hetrazan was used, with some immediate success, but microfilariae reappeared in 8 of 16 patients.

CASILE (p. 1143) discusses *W. bancrofti* infection in French Guiana, where it is prevalent.

A high incidence of periodic *W. bancrofti* infection exists on Okinawa, and SIMPSON (p. 67) notes that although the common vector is *C. fatigans*, another probable vector is *A. hyrcanus sinensis*. JACKSON (p. 8) reports that *A. hyrcanus sinensis*, *A. minimus* and *A. maculatus* have been successfully infected with *W. bancrofti*.

In part of Brazil DEANE (p. 887) studied the habits of *C. fatigans*, the chief vector of *W. bancrofti*. It is a domestic and anthropophilic species, is prevalent throughout the year, with a peak in March (wet season), and tends to enter houses at dusk, to a maximum density in the middle of the night. Control by residual spray is feasible, but the spraying should include the upper, as well as the lower, surfaces of the walls.

SCHMID and DASSANAYAKE (p. 71) show that in thick-drop preparations eosinophiles tend to accumulate round microfilariae of *W. bancrofti*.

JASWANT SINGH and RAGHAVAN (p. 70) have studied the ex-sheathing of microfilariae of *W. bancrofti* in blood containing hetrazan, kept under reduced atmospheric pressure.

HAWKING and THURSTON (p. 1141) carefully investigated in monkeys and dogs the subject of microfilarial periodicity. They concluded that most of the microfilariae which disappear from the blood during the daytime accumulate in the lungs, and that the periodicity is due to migration between these two sites. The authors do not believe that the microfilariae are produced each evening to be destroyed within 24 hours; they think that the microfilariae live longer than this, and appear in and disappear from the peripheral blood by a to-and-fro migration, principally to the lungs. The mechanism by which this is effected is not known, but may be some hypothetical chemical change in the blood. MCFADZEAN (p. 886) has also attempted to discover the cause of microfilarial periodicity in monkeys. Exposure to an atmosphere of 60 per cent. oxygen caused a pronounced migration from lungs to blood, even at night when the blood contained many microfilariae, and the same was true of the state of anoxia, and of energetic exercise. Carbon dioxide had no effect, and there was no relationship between microfilaraemia and the phosphate cycle, or general vasodilatation, temperature, pulse or respiratory rate.

The Summary of Proceedings of the Conference of Experts on Filariasis and Elephantiasis (SOUTH PACIFIC COMMISSION, p. 165) contains accounts of papers and suggestions by a number of workers. The abstract should be read in full; it sets out many of the problems which await solution.

From their experience in Fiji MANSON-BAHR and MUGGLETON (p. 1061) argue that the non-periodic type of *W. bancrofti* should be classed as a distinct variety, or even species, for which the senior author some years ago proposed the name *W. pacifica*. They quote epidemiological evidence in support of this view, and also show that *Aëdes scutellaris pseudoscutellaris* and *Aëdes s. polynesiensis* are optimum hosts for the non-periodic microfilariae. The frequent association of severe clinical manifestations with the non-periodic infection is probably a reflection of heavy infection. In an addendum to this paper BUCKLEY compares the periodic and non-periodic adult filariae. He found some morphological differences, but their significance needs confirmation by more extended observations.

MANSON-BAHR (p. 788) describes certain free-living nematode larvae and eggs which he found in Fiji in blood taken for examination and treated with formalin solution. The nematodes were probably in the distilled water used in preparation, and this could be a source of considerable error.

MARKS (p. 168) gives reasons for assigning to the vector of *W. bancrofti* (non-periodic) of Polynesia the name *Aëdes polynesiensis* sp. nov. This name is accepted (in comment) by Buxton, and a valid distinction is drawn between this mosquito and *Aëdes pseudoscutellaris*.

A case of non-symptomatic microfilaraemia due to *W. bancrofti* is reported by CONN and GREENSLIT (p. 980) 7½ years after exposure to infection. As a rule, in infected veterans, there are lymph node enlargements and dull pain and swelling of the affected parts after exertion. A case of haematochyluria is described by HUARD *et al.* (p. 888). RODHAIN (p. 1064) discusses the pathological changes found in varicose groin glands excised from patients with *W. bancrofti* or *O. volvulus* infection, or both.

From New Guinea VAN DER HOEVEN (p. 981) makes the point that a dosage of 300 mgm. hetrazan daily for 10 days killed all microfilariae in treated patients, but that there were many relapses later.

OTTO *et al.* (p. 982) treated with arsenamide a few patients who had *W. bancrofti* infection, and report good results and only minor toxic signs. But in comment Hawking recalls a patient who died after its use.

W. malayi, etc.—

SENOO and LINCICOME (pp. 426, 427) report that *W. malayi* was found in Southern Korea and Quelpart Island; incidence was highest (26·6 per cent.) on that island.

RAGHAVAN *et al.* (p. 1140) show that *Mansonia annulifera* may be a host of the dog filaria *Dirofilaria repens* in India, and that larvae found in dissection of these mosquitoes are therefore not to be assumed to be *W. malayi* without proof. In an investigation of the habits of Malayan mosquitoes WHARTON (p. 361) found that *Culex fatigans* preferred to feed indoors and sought human in preference to animal blood. On the other hand, *Mansonia uniformis* and *M. longipalpis* preferred cattle blood—a surprising finding—and tended to feed outside.

LÓPEZ-NEYRA and BALCÁZAR RUBIO (p. 428) report a case of infection (of the skin of the arm) with the dog filaria *Dirofilaria conjunctivae*. FAUST *et al.* (p. 980) report several unusual filarial findings in man; two were probably specimens of *Dirofilaria conjunctivae* from superficial nodules.

HAWKING *et al.* (p. 1143) have tested methylene violet against filariae of cotton rats, and in human filariasis; it was not active against the larval forms in man.

Onchocerca.—

A bibliography of onchocerciasis has been published by the PAN AMERICAN SANITARY BUREAU (p. 531).

HUGHES and DALY (p. 168) found a new focus of onchocerciasis on the Volta in the Gold Coast, where evidence of the disease was found in about 70 per cent. of the villagers examined. The authors refer to the skin conditions as "presbydermia", which was very common, as were nodules. Microfilariae were found in the eyes of 47 of 83 who showed them in the skin, and ocular lesions were particularly common in those with microfilariae in the eyes, and especially in persons aged 30–40. The vector is *S. damnosum*. The efficiency of dimethyl phthalate as a repellent was confirmed. The building of the dam on the Volta river, Gold Coast, will eventually destroy breeding places of *Simulium damnosum* for a long distance above it, but not along the 15 miles on the seaward side. HUGHES (p. 708) has studied the prevalence of this fly in relation to the fluctuations in the height of the river at different seasons, so that comparisons may be made when control is attempted in the future. Breeding is continuous in the lower Volta, but in the northern territory the river is dry for many months; it is not known how the fly succeeds in repopulating these upper reaches when the river floods, but it is thought that eggs may persist in the viable state. PUYUELO and HOLSTEIN (p. 71) show that onchocerciasis is very prevalent in French West Africa, all the foci being near the Volta and its tributaries, which form the permanent breeding places for *Simulium*. The flies bite chiefly in the evening before dark, or in the morning, and mostly they bite below the knee (97 per cent.). The incidence of nodules rises to almost 50 per cent. in adults in some places, and blindness rates up to 2·6 per cent. are quoted (13–35 per cent. in some villages). Ocular lesions in general are more frequent, up to 14 per cent. The authors state that treatment with hetrazan is the best available.

MCMAHON (p. 73) has established the fact that larvae and pupae of *Simulium neavei* live in phoretic association with a fresh-water crab (*Potamon niloticus*) in certain rivers of Kenya, and that about 50 per cent. of the crabs examined carried these forms. This has a bearing on control of onchocerciasis in that it will be necessary to treat with DDT only those rivers inhabited by the crabs, or neighbouring water, and in that the easiest method of control might be through some substance toxic for the crabs. The same author (p. 984) has revised his former opinion that *S. neavei* was the only species living in phoretic association with crabs in Kenya, having found two other species of *Simulium* in the same association.

In work which was done before the control of *Simulium neavei* with DDT was begun, BUCKLEY (p. 709) in Kenya found that discriminative clearing of bush along two infested rivers, and the cutting out and removal of all undergrowth, was eventually responsible for eradication of the fly. The experiment did not indicate the minimum amount of clearing needed.

LEBIED (p. 789) argues that larvae of *O. volvulus* depress the activity of the thoracic muscles of infected *Simulium*, and this may explain the localization of onchocerciasis to restricted areas

Human onchocerciasis in Guatemala is probably carried by species of *Simulium*, though the evidence is not conclusive since microfilariae found in these flies, in some instances, belong to species which infect animals but not man. DALMAT (p. 291) found flies on plantations where they were not

breeding, and by marking them with dyes he discovered that the range of flight extended to 7·4 miles, and possibly more. After investigation in Guatemala GIBSON and ASCOLI (p. 1144) conclude that there is no evidence to incriminate *Culicoides* spp. as vectors of *O. volvulus*.

GIBSON (p. 984) compares the morphology of microfilariae of *O. volvulus* with that of other species from horses and cattle in Guatemala.

Study of 3,310 cutaneous biopsies from 16 patients showed that microfilariae of *O. volvulus* tend to distribute themselves over the whole of the upper part of the body, especially the shoulders, and are not necessarily most numerous near a nodule. MAZZOTTI (p. 427) makes the point that negative biopsies may alternate with positive, and that repetition is needed before a negative report is justified.

It seems to be generally accepted that hetrazan acts only on the microfilariae in onchocerciasis, leaving the adult worms unharmed. MAZZOTTI (p. 74) in Guatemala writes in this strain, and HAWKING (p. 890) has made a histological study of nodules and skin biopsies in onchocerciasis before, during and after treatment with hetrazan, and concludes that the drug has no action on the adult worms, but destroys microfilariae probably by an opsonin-like action. The allergic reaction provoked in infected persons can be used as an additional means of diagnosis.

In Guatemala BURCH and ASHBURN (p. 74) made a comparative study of suramin and hetrazan in onchocerciasis, and they conclude that hetrazan causes only slight damage (if any) to the adult worms, whereas suramin kills most of them. They recommend suramin as the treatment of choice, but there are certain toxic reactions. SARKIES (p. 1066) also writes favourably of antrypol (suramin) in ocular onchocerciasis. Hetrazan given along with it did not produce better results.

BURCH (p. 170) observed that administration of hetrazan to patients with onchocerciasis usually gave rise to pruritus, but not with Bancroftian filariasis. This was so marked that he regards it as a simple and trustworthy test of onchocercal infection.

Loa loa, etc.—

KERSHAW (p. 888) has made a study of the influence of town and village evolution on the epidemiology of *Loa loa* infection in West Africa. He shows that rubber tappers in S. Nigeria, by virtue of their work, are in close contact with *Chrysops*, and show high infection rates, and that similar high rates are found in women who live in villages in the rain forest and who enter the forest freely. Similarly with schoolchildren; in one place near the forest the rate was high, and in another in open farm country it was much lower. He discusses the effect of farming and clearing on activity of the flies and their contact with man, and also the effect of village development on infection with *Dipetalonema perstans*.

An extensive study of *Chrysops* spp., especially *C. dimidiata* and *C. silacea*, is recorded by DAVEY and O'ROURKE (p. 289), who observed their haunts along the rivers, their abundance during the rainy season, the times at which they bite, and the animals they attack. Breeding places are described and there are notes on the larval and pupal stages, and on measures of control. The original abstract is very full.

CHABAUD (p. 983) discusses the genus *Dipetalonema* and its classification. He points out that the *D. perstans* female possesses 4 cuticular appendages at the posterior extremity, not 2 as hitherto believed. *Dipetalonema streptocerca* is widespread in parts of the Belgian Congo, the incidence ranging from 2 to 100 per cent. in different places (VAN DEN BERGHE and CHARDOME, p. 788). For the first time, infection with *D. streptocerca* is

reported from the Upper Volta region, French West Africa. PFISTER (p. 1065) also reports the incidence of *D. perstans* (very high) and *O. volvulus* in the Black Volta area. *W. bancrofti* was also found.

CHARDOME and PEEL (p. 982) describe a new filarial worm, *Tetrapetalonema berghei* n. sp., from a man in the Belgian Congo. VAN DEN BERGHE (p. 982) points out that the close resemblance of its microfilariae to those of *D. perstans* is likely to prevent recognition, and CHABAUD (p. 983) regards the two species as identical.

Dracunculus

D. medinensis is often found in the fatty tissues in contact with hernial sacs or alongside the spermatic cord or the testis, or in the tunica vaginalis, but it is rarely found free in the peritoneal cavity, as in the case described by DEJOU and CAMAIN (p. 171). The worm was dead and partly encysted. DÉJOU (p. 428) discusses the deep localization of the guineaworm.

BHAJEKAR (p. 292) gives a fresh preparation of the roots of the banyan tree, by mouth, for the treatment of *D. medinensis* infection in India, and claims cure in about 85 per cent. of cases.

Enterobius, Trichinella, etc.

Bed linen is an important source of infection with *Enterobius vermicularis*. KOZAR (p. 293) found eggs in 73·4 per cent. of samples of dust from sheets used by children in a home in Poland, 90 per cent. of whom were infected. Eggs were also found in dust from various parts of the buildings.

GOETERS (p. 789) found *Enterobius* eggs under the finger nails of infected children, and, by a flotation method, in room dust. Eggs from dust remained viable for 9–13 days according to humidity.

SCHEIBE (p. 429) discusses *Enterobius* infection in relation to the appendix. He uses a preparation of phenothiazine in treatment, with or without appendicectomy as the condition indicates.

Enterobiasis is prevalent in children in Czechoslovakia, especially in the country towns and rural areas. JÍROVEC (p. 710) states that for treatment gentian violet has been almost completely abandoned, and he uses a combination of phenothiazine 0·25 gm., hexylresorcinol 0·05 gm. and basic fuchsin 0·05 gm. as a keratin-coated tablet. The dosage for a child aged 2–3 years is 1 tablet morning and evening before food for 2 days, for adults 2 tablets 3 times a day for 7–8 days, and for persons between these ages the dosage is intermediate. This is reasonably successful, but it may be necessary to repeat the course.

BROCK *et al.* (p. 712) used Atrimon (the carbinol base of crystal violet) for enterobiasis. It is usually successful if given for 7–10 days, but repetition may be needed. WELLS *et al.* (p. 639) have used terramycin in 61 cases, and conclude that it gives satisfactory results on the whole, and is more effective than gentian violet. LOUGHLIN *et al.* (p. 712) write very favourably of terramycin base. They gave single doses (for persons over 10 years of age) of 2 gm., daily for 5 days, though continuation for 7 days would probably be better.

KLIMARS (p. 639) gives an aluminium preparation (Oxymor) internally, as an anal ointment and as an enema.

A liberal diet of bilberries seems to have cured some Norwegian children of *Enterobius* infection. It was continued for 3 days, nothing else but milk being allowed for that period (LANDTMAN, p. 985).

An enema of hexylresorcinol (1 in 300) repeated every few days, is stated by BASNUEVO *et al.* (pp. 429, 638, 639) to be a satisfactory treatment for *Trichuris* infection.

RICCI (p. 294) reviews the occasional outbreaks of trichiniasis which have occurred in Italy. He believes that a certain number of cysts must be swallowed before any serious clinical symptoms arise in man. A rapid method of detecting *Trichinella* cysts in muscle tissue, which involves breaking up the tissue in a Waring blendor, washing it through gauze, sedimenting the suspension, and examining the sediment, is described by HILL (p. 431).

A rapid flocculation serum test for trichiniasis is described by BOZICEVICH *et al.* (p. 431), which agrees well with the complement-fixation test. SCHWONZEN (p. 172) refers to the increase in serum γ-globulin which occurred in trichiniasis, which he studied by electrophoresis, and which reached very high values, with return to normal in 4–8 months. This is not a specific feature of trichiniasis, but would be very useful in diagnosis.

In human trichiniasis ACTH diminished the symptoms and the fever, and in animal infection it reduced the toxic effects temporarily, without producing any anatomical difference in the larvae (LUONGO *et al.*, p. 432). Apparent benefit from ACTH in one case is reported by DAVIS and MOST (p. 986), and ROSEN (p. 531) states that cortisone seemed to be strikingly beneficial in another case.

Although roentgen radiation is able to damage larvae of *Trichinella*, extremely high doses are needed, and ALICATA (p. 295) thinks that it could not satisfactorily be used commercially in the treatment of meat.

A human case of infection by *Gongylonema pulchrum* is reported by THOMAS (p. 1145) from the United States. *Charles Wilcocks*

MALARIA

DRAPER, C. C. **Observations on the Infectiousness of Gametocytes in Hyperendemic Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Mar., v. 47, No. 2, 160–65. [12 refs.]

Observations on malaria were made in a village in South-West Nigeria, 60 miles inland from Lagos, just after the height of the malaria season. Anopheline density was about 3 per room (chiefly *Anopheles gambiae* with a few *A. funestus*), the sporozoite rate was 2 per cent., and 83 to 92 per cent. of the mosquitoes had fed on human blood. The crude parasite rate was highest (at 81 per cent.) in the 1–4-year age-group; most of the infections were due to *Plasmodium falciparum*, with 12 per cent. *P. malariae* and a few *P. vivax* and *P. ovale*. Crescent carriers were commonest between the ages of 1 and 4, 83 per cent. of crescent carriers of all ages showed a low density (less than 100 gametocytes per cmm.); 17 per cent. between 100 and 200. Crescent densities were assessed in thick blood films by counting the parasites against the leucocytes and measuring the latter by Dacie's tube dilution method.

Mosquitoes (*A. gambiae*) were bred from larvae collected in the field and were given a single feed on gametocyte carriers; they were then maintained on sugar solutions at temperatures from 22°C.–35°C. Infection rates (oöcyst or sporozoite) varied according to the gametocyte density, 1 per cent. of the mosquitoes becoming infected if the density (*P. falciparum*)

were 1–10 per cmm., 6 per cent. for the 11–100 group and 43 per cent. for the 101–200 group. Thirty-two mosquitoes were fed on 5 *P. malariae* carriers showing densities of gametocytes varying between 100 and 500 per cmm.—only one mosquito became infected, with sporozoites appearing in the salivary glands in 14 days. These data are used to assess the proportion of *A. gambiae* which would become infected after feeding on the population at any given time. *P. C. C. Garnham*

Reid, J. A. **The *Anopheles hyrcanus* Group in South-East Asia (Diptera: Culicidae).** *Bull. Entom. Res.* 1953, Apr., v. 44, Pt. 1, 5–76, 13 figs. & 1 diagram. [Numerous refs.]

This is a highly detailed, entomological study of the south-east Asian forms of the mosquitoes of the *Anopheles hyrcanus* complex. It is shown that there are at least 7 forms of *hyrcanus* in the Malay Peninsula alone but by using a combination of characters individual adults of either sex may be identified. Further, offspring reared from eggs are found to be always of the same form as the female parent and larvae, pupae and eggs can usually be distinguished. Keys are given for the identification of early stages as well as for the adults.

The forms, regarded as distinct species, have all been described and named before, except *crawfordi* which is new. The others are *sinensis*, *nigerrimus*, *lesteri*, *indiensis*, *argyropus* and *peditaeniatus*. Species from different countries show geographical variation.

A full description is given of all stages of each of the species, accompanied by illustrations of important morphological features, notes on identification and locality lists. The questions of classification, nomenclature and synonymy are discussed as also are the biology and relation to disease of each of them.

Though *Anopheles "hyrcanus"* is generally a swamp breeder with a preference for animal blood, the individual species show certain differences in their biology for some seem to prefer sunlit waters and others shaded places. Most of them will bite man out of doors after dark but they are not house frequenters. All the species can be captured at night in and around cattle sheds.

A. h. nigerrimus [which the author identifies with "var. X" and *venhuisi*] is a vector of malaria in Malaya and the same species plays a part in the transmission of Malayan filariasis [the evidence for this is quoted]. *A. h. sinensis*, probably harmless in Malaya, is a vector of malaria and bancroftian filariasis in parts of China, though the exact identification of the vector is now in doubt as there appear to be two forms in China included under this name, an oriental and a palaearctic form. This problem calls for further investigation.

Such studies as this help to explain why some species of *Anopheles* (such as *nigerrimus* and *sinensis*) are vectors of malaria in one area and not in another. *H. S. Leeson*

See also p. 858, Sommerman; Foote, **Pictorial Keys to the Mosquitoes of Medical Importance in Korea and Formosa.**

Lowe, J. **Acute Malaria probably precipitated by A.C.T.H.** [Correspondence.] *Brit. Med. J.* 1953, June 13, 1332.

ACTH (50 mgm.) was given to a European woman being treated with hetrazan for probable filarial infection. A severe attack of *P. falciparum* malaria associated with intestinal symptoms occurred 3 days later. The

malarial attack was controlled with intravenous quinine followed by chloroquine. The patient had been taking pyrimethamine 25 mgm. once weekly as a malarial suppressant for the previous 3 months with apparent complete success. She took a dose of pyrimethamine on the day on which she received the ACTH. The author suggests that the ACTH might have temporarily neutralized the patient's immunity to malaria. He does not discuss other possibilities. *B. G. Maegraith*

MOCHTAR, I. A. De behandeling van het nephrotische syndroom met *Plasmodium vivax*. [**The Treatment of the Nephrotic Syndrome with** *Plasmodium vivax*] *Nederl. Tijdschr. v. Geneesk.* 1953, May 30, v. 97 (ii), No. 22, 1390–94, 2 figs.

The English summary appended to the paper is as follows:—

"Four children suffering from nephrotic nephritis were infected with Plasmodium vivax. In none of the cases any favourable influence on the morbid process could be demonstrated."

LE BLAYE, R. La quinine colloïdale. (Revue critique.) [**Colloidal Quinine—A Critical Review**] *Rev. Paludisme et Méd. Trop.* 1953, Apr.–May, v. 11, No. 106, 73–84. [15 refs.]

GUGGENHEIM, K. & SHAMIR-ZERNIK, R. **The Riboflavin-Sparing Action of Atabrine.** *J. Biol. Chem.* 1953, May, v. 202, No. 1, 331–7. [12 refs.]

JELLIFFE, D. B., with the technical assistance of E. F. P. JELLIFFE. **The Out-Patient Treatment of Malaria with Single Dose Intramuscular Chloroquine in a Hyperendemic Area in West Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, May, v. 47, No. 3, 235–8.

Forty African children aged from 4 to 27 months suffering from overt malarial attacks (30 *P. falciparum*, 8 *P. malariae*, 2 mixed *P. falciparum* and *P. malariae*), living under hyperendemic conditions, were treated as out-patients with a single intramuscular injection of chloroquine (5 mgm. of base per kgm. bodyweight). Parasitic clearance and clinical cure were effected within 2 days, although in some instances parasitaemia reappeared 2 to 6 weeks later, due either to reinfection or relapse. No ill-effects attributable to the action of the drug were observed, nor was there any sign of fibrotic gluteal nodules or sterile abscesses, such as are sometimes seen in malnourished and anaemic children after intramuscular injection of quinine.

In tropical Africa, as elsewhere, diarrhoea and vomiting are common features of infant malaria, and the absorption of orally administered drugs is problematical. Admission to hospital is frequently impossible, owing to insufficient accommodation and to the unwillingness of working African mothers to leave their employment. Under such circumstances a drug which can be safely administered by a single intramuscular injection to out-patients, with rapid clearance of parasitaemia and relief of symptoms, has very obvious advantages. *G. Covell*

KNORR, R. Parenterale Resochin-Therapie. [**Parenteral Resochin (Chloroquine) Therapy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Mar., v. 4, No. 2, 153–5.

The author gives a very brief summary of the treatment in Addis Ababa of 92 cases of malaria complicated by vomiting or cerebral symptoms. The species of parasite is not stated except in the 3 cases of which details are given (in one of these the parasite was *P. vivax*, in the others *P. falciparum*).

The Resochin [chloroquine] was injected intravenously or intramuscularly in individual doses of 0·25 gm. (5 ml. of 5 per cent. solution). Intravenous injection was given slowly—5 ml. in 3 minutes. Details of total dosage are not given.

Side effects included a prompt fall of blood pressure of 15 to 20 mm. Hg after intravenous injection. *B. G. Maegraith*

Mohr, W. Parenterale Resochintherapie bei den verschiedenen Malariaformen [**Parenteral Treatment of Different Forms of Malaria with Resochin (Chloroquine)**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Mar., v. 4, No. 2, 137–53, 6 figs.

The author gives details of some 30 cases of *P. falciparum*, *P. vivax* and *P. malariae* malaria treated by parenteral injection of a 5 per cent. solution of Resochin [chloroquine]. Fifteen patients were treated intravenously, each dose being 0·5 gm., *i.e.*, 10 ml. of the 5 per cent. solution. One patient received three such doses in 26 hours. The results were uniformly successful, the fever subsiding in an average time of 28 hours, and schizonts disappearing in an average time of 64 hours (longest 137 hours; shortest 18 hours).

Intramuscular injection of the same solution was also successful, in about the same time, but the cases treated in this manner were less severe than those treated intravenously. Total parenteral dosage was 1·0 to 1·5 gm. given in individual injections of 0·5 gm. (10 ml. of solution) usually at intervals of 6–8 hours.

Two patients received two individual doses of 0·75 gm. 6 hours apart.

Temporary side effects were noted after intravenous injection, including fall of blood pressure, headache and blurring of vision. These effects were less marked after intramuscular injection.

The author concludes that intramuscular injection of 0·5 gm. Resochin (10 ml. of 5 per cent. solution) given two or three times at intervals of 6 to 12 hours will deal with most severe cases of malaria. Intravenous injection of 0·5 gm. Resochin at intervals of 6–8 hours is required in grave cases only. Two injections should suffice. (One of the patients received three.) *B. G. Maegraith*

Gunther, C. E. M. **Sidelights on Chloroquine: Two Cases of Interest.** *Med. J. Australia.* 1953, Apr. 25, v. 1, No. 17, 594.

Two cases are discussed:—

i. An attack of *P. vivax* malaria developed in a breast-fed child of about 5 months. The child was receiving no direct malarial suppressive therapy but the mother had at that time been taking chloroquine diphosphate 250 mgm. 3 times a week for approximately 4 months; before this she was taking 100 mgm. paludrine [proguanil] daily. The malaria in the child responded to quinine and the mother returned to paludrine as a suppressive. Since then the child has been free from malaria. [The date of the communication is not given.] The author suggests that enough paludrine is excreted in the mother's milk to act as a suppressive for the infant, whereas chloroquine is concentrated in the liver and not excreted in the milk in sufficient amount to act as a suppressive. [No information regarding the endemicity or age incidence of malaria in the district of New Guinea concerned is given.]

ii. A clinical diagnosis of amoebic abscess of the liver was made in an adult who had been taking 250 mgm. chloroquine diphosphate 3 times a

week for about 4 months. The signs and symptoms responded rapidly to intramuscular emetine hydrochloride. The author concludes that dosage of chloroquine sufficient to suppress malaria is inadequate to prevent hepatic amoebiasis.

[The diagnosis of amoebic abscess was not confirmed parasitologically.]

B. G. Maegraith

CODA, D. Ação dos novos medicamentos anti-maláricos. [**Action of New Anti-Malarial Drugs**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1952, June, v. 17, No. 52, 193–206. [38 refs.]

The English summary appended to the paper is as follows:—

"The Author made the summary of the national and foreign literatures regarding the anti-malarial drugs derived from the biguanidine and from the 4-aminoquinolines, chiefly on what relates to the gametocyticidal action.

"Afterwards, he gives account of his observations relative to 747 patients bearing the sexual and asexual forms of *vivax* and *falciparum* plasmodia, and associated plasmodia (*vivax* and *falciparum*) as well, treated by means of anti-malarial preparations derived from the biguanidine.

"To 187 patients bearing the same species and forms of plasmodia he administered the CAM-AQ1 and to 159 patients in the same condition he gave the Chloroquine, both derived from the 4-aminoquinoline-nucleus.

"In his work he inserts tables containing the doses of the anti-malarial medicaments used, and also the duration of treatment.

"In conclusion the author says that all those drugs exert an action on the sexual forms of the *vivax* and *falciparum* plasmodia, the Chloroquine being that which presented the most efficient and positive results.

"As the patients on the littoral presented themselves very susceptible to the treatment, there being rapid cures, the author, suspecting strange influences favourable to the action of the medicaments, such as the premunition and weakened strains of parasites, he sought patients living 600 km. far from the littoral possibly exempt from these factors, having, however, obtained the same results as to the clinical-parasitic cure and disappearance of the sexual forms of the plasmodia."

CHAKRAVARTY, N. K. & CHAUDHURI, R. N. **Primaquine in Malaria.** *Indian J. Med. Sci.* 1953, May, v. 7, No. 5, 236–40.

Forty-one Indians suffering from overt malarial attacks (4 *P. falciparum*, 34 *P. vivax*, 1 mixed *P. vivax* and *P. falciparum*, 2 *P. malariae*) were arranged in 3 groups. Group A received primaquine only (10–15 mgm. base daily for 10 days); Group B, chloroquine (0·75 gm. base on 1st day, 0·25 gm. on 2nd and 3rd days) and primaquine (20 mgm. base on 1st day and 10 mgm. on 2nd and 3rd days); Group C, quinine sulphate (1·0 to 1·5 gm. daily for 7 to 10 days) and primaquine (10 to 15 mgm. base daily for 10 to 14 days).

It was observed that while primaquine alone could terminate an acute attack of *P. vivax* or *P. malariae* infection, a more prompt response was obtained by the concurrent use of chloroquine or quinine. In acute *P. falciparum* malaria the action of primaquine is described as slow and uncertain. *P. vivax* and *P. malariae* gametocytes were eliminated from the peripheral blood within 3 days in 91 per cent. of cases, and within 5 days in the remainder. *P. falciparum* gametocytes disappeared within 4 days after clearance of asexual parasites. Twenty *P. vivax* and 1 *P. malariae* cases were followed up for 1½ to 16 months, during which time relapses were

recorded in respect of 2 of the patients who had received the combined primaquine and quinine treatment.

[Of the 21 cases on which the relapse rate was calculated, 3 out of 7 in Group A were observed for 2 months only, 5 out of 6 in Group B for 1½ to 2½ months only, and 4 out of 8 in Group C for 3 to 6 months only. The subjects of the study, being indigenous inhabitants of a malarious country, presumably possessed some degree of immunity as the result of previous attacks; moreover, as the authors point out, the 2 cases classed as relapses may have been reinfections. Under such circumstances, any attempt to assess the effect of a drug on the relapse rate in *P. vivax* and *P. malariae* infections can be of little value.] *G. Covell*

Covell, G., Shute, P. G. & Maryon, M. **Pyrimethamine (Daraprim) as a Prophylactic Agent against a West African Strain of** *P. falciparum*. *Brit. Med. J.* 1953, May 16, 1081–3.

This is an extremely interesting and valuable contribution to the study of pyrimethamine as a prophylactic against *P. falciparum* malaria. The object of the experiments was to ascertain whether the drug in dosage of 25 mgm. weekly could prevent an attack of *P. falciparum* malaria in a non-immune subject. The strain of *P. falciparum* was obtained from an African child living in Ilaro, Nigeria. The strain was transmitted through *A. stephensi*. Fourteen patients, two of whom had had previous therapeutic *P. vivax* infection, were engaged in the trial. They were arranged in 7 pairs, each pair receiving 25 mgm. pyrimethamine on a different day of the week. Each subject was exposed to the bites of 10 to 12 mosquitoes on the 8th, 11th, 15th, 18th and 21st days of the experiment. Mosquito infections were heavy for the first 3 feedings and thereafter diminished in intensity.

A control infection was produced in a patient infected with the same batch of mosquitoes on the 9th day. Parasites appeared in the peripheral blood 7 days after infection and fever two days later.

Up to the 35th day of the experiment, *i.e.*, 14 days after the last biting, no parasites were found in any of the 14 patients. Protection thus appeared to be complete.

The authors consider that pyrimethamine in these experiments acted as a true causal prophylactic. Part of their interesting discussion should be quoted in full:—

"As to the practical application of the findings recorded, pyrimethamine in this dosage seems likely to prove an effective and economical agent for the prevention of malaria among populations under disciplinary control, provided it can be ensured that the weekly dose is actually taken with unfailing regularity; for instance, in the case of a labour force paid on a weekly basis, where the drug can conveniently be administered at the time when wages are distributed.

"For private individuals and officials or for populations not under disciplinary control, we do not consider that a weekly dose of any anti-malarial drug offers a sufficient margin of safety. Experience has shown how easy it is for those on a daily dose régime to miss taking the drug, particularly in times of stress, and the risk is all the greater when the prescribed interval is as long as seven days.

"We believe that in such circumstances the daily dose of 5 mg. of pyrimethamine adopted by Goodwin [this *Bulletin*, 1952, v. 49, 664] for his personal protection offers a better prospect of success, provided that its efficacy is confirmed by more extended field trials." *B. G. Maegraith*

RACHOU, R. G. Sôbre o combate aos anofelinos do sub-gênero *Kerteszia* no sul do Brasil. [**Control of** *Anopheles* (*Kerteszia*) **Mosquitoes in Southern Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1952, July, v. 4, No. 3, 245–54. English summary (3 lines).

After some general remarks on *Anopheles* and malaria in Brazil the author emphasizes the importance of species of the subgenus *Kerteszia* in Southern Brazil, concentrating on the two important malaria vectors *cruzii* and *bellator*. He summarizes what has been done by the National Malaria Service to control or to eradicate these two anophelines.

Some topical data are given; for example, in 30 localities of 14,670 bromeliads examined, 2,329 (15·9 per cent.) contained larvae; this percentage varied among the communities from 3·5 to 57·1. There was an average of 40 larvae for each 100 bromeliads and the average amount of water per plant was 100 cc. though the amounts were extremely variable, one plant containing as much as 5 litres. Larvae of *bellator* were generally found in the more exposed sites while those of *cruzii* were more common in shaded places.

The majority of adults of *Anopheles* (in some places 99 per cent.) caught in houses belonged to the subgenus *Kerteszia*, *cruzii* being more common than *bellator*. The time of entry into houses had 2 peak periods, one in the early morning and the other in the early evening. These species feed outside also, on animals as well as on man, though precipitin tests indicate that stomach contents consist more often of human than of animal blood.

Marking and recapturing experiments showed that the maximum distance at which marked specimens were recovered was 2,093 metres (approx. 2,288 yards) but a distance of 1 kilometre from the breeding place is mentioned as the effective range for *cruzii*.

Control measures are adjusted according to local conditions and consist of DDT spraying in houses, or outside, and the use of larvicides. In rural areas, house spraying is usually all that is possible, and in towns this method is often combined with the destruction of the bromeliads, chiefly by application of copper sulphate. *H. S. Leeson*

VINCKE, I. H. & PEETERS, E. Observations sur la transmission de sporozoïtes d'*Anopheles dureni* à des rongeurs sauvages et de laboratoire. [**Transmission of Sporozoites of** *P. berghei* **from** *Anopheles dureni* **to Wild and Laboratory-Bred Rodents**] *Ann. Soc. Belge de Méd. Trop.* 1953, Feb. 28, v. 33, No. 1, 87–93.

This paper reports the results of further experiments in the transmission of *Plasmodium berghei* by inoculation of sporozoites from wild-caught *Anopheles dureni* into various rodents [see also this *Bulletin*, 1951, v. 48, 714]. Salivary glands were dissected in normal saline plus 2 parts per 1,000 of "bovalbumin, Fraction V," and after about 1 hour were inoculated intraperitoneally (or in 2 cases intradermally) into white rats, *Thamnomys*, *Praomys*, *Cricetomys* and a white mouse. Twenty-three strains of the parasite were isolated in these animals—chiefly in the rats. Details of the experiments are given in a table, in which the incubation or pre-patent period is clearly indicated. This period is usually 6 days, but it was as short as 4 days in the case of 1 *Thamnomys* and 3 days in 1 white rat. However, the following experiment showed that the pre-patent period is even shorter: a white rat was inoculated intraperitoneally with 6 positive glands; 10 drops of blood were then taken daily and inoculated into white mice—the subinoculation on the first day (24 hours) was negative, but the 2nd, 3rd, 4th and 5th were all positive. The original rat did not show visible

parasites until the 5th day. [This important experiment again suggests that the pre-erythrocytic stage of *P. berghei* is of the avian rather than the mammalian type; it is probable that cryptozoites were set free into the circulation about the 48th hour, and that these completed their metacryptozoic development in the new host which subsequently showed a typical blood infection.] *P. C. C. Garnham*

Satya Prakash, Krishnaswami, A. K. & Ramakrishnan, S. P. **Studies on *Plasmodium berghei* n.sp. Vincke and Lips, 1948. V. On the Host Range in Blood-Induced Infections.** *Indian J. Malariology.* 1952, June, v. 6, No. 2, 175–82. [21 refs.]

Three monkeys (*Macaca mulatta*), 1 guineapig, 1 rabbit, 1 cat, 1 mongoose, 1 pigeon and 3 bandicoots were inoculated with *Plasmodium berghei*, either intravenously or intraperitoneally, with or without splenectomy of the host animal. All these attempts at transmission were said to have been unsuccessful. The nature of host specificity of malaria parasites in general is discussed and it is suggested that in this respect *P. berghei* behaves more like the avian than the mammalian parasites. [Sub-inoculations of the blood of one bandicoot into the peritoneum of rats at intervals of 5 minutes, 1–6 hours, and 5 days gave positive results, and the authors thereby conclude that (a) parasites are able to survive in the plasma of bandicoots, which is therefore non-lethal to them, and (b) bandicoot erythrocytes are inhospitable to the parasites, which continue to multiply in the rat cells. They state that the bandicoot is refractory—but it would seem more probable that an occult infection was produced with true invasion of bandicoot corpuscles, and that this animal should be added to the list of those susceptible to the parasite.] *P. C. C. Garnham*

Terzian, L. A., Stahler, N. & Miller, Helma. **A Study of the Relation of Antibiotics, Vitamins and Hormones to Immunity to Infection.** *J. Immunology.* 1953, Jan., v. 70, No. 1, 115–23, 7 figs.

Earlier papers [this *Bulletin*, 1951, v. 48, 447; 1952, v. 49, 846] reported on the influence of the sulphonamides and aureomycin, streptomycin, folic acid and para-aminobenzoic acid on the susceptibility and resistance of mosquitoes (*Aëdes aegypti* and *Anopheles quadrimaculatus*) to infection with *Plasmodium gallinaceum*. The present paper extends these studies to observations on the effects of other antibiotics, water soluble vitamins, and some mammalian and plant hormones. The test material was *Aëdes aegypti* and *P. gallinaceum*, the various compounds being added to the 4 per cent. sugar solution used for maintaining the adult mosquitoes before and after the blood meal on an infected chick. The addition of the compound under test usually extended from 72 hours before to 72 hours after the blood meal. The effects of the compounds were assessed from oöcyst counts on the 5th to 7th day after infection. Control mosquitoes were fed simultaneously on the chick in each experiment. The results are derived from oöcyst counts of about 40 drug-influenced mosquitoes and a similar number of control mosquitoes.

Results with antibiotics were as follows: penicillin at 100 to 5,000 units per ml. increased susceptibility, with a 5-fold increase at 1,000 units per ml. as a maximum effect. Chloramphenicol and tyrothricin caused, respectively, 3-fold and 4-fold increases in susceptibility. But with all 3 antibiotics the highest concentrations were less effective than intermediate concentrations of the compound. Terramycin, on the other hand, caused

depression of the susceptibility of the mosquitoes, with as much as about a 7-fold decrease. At the highest concentration used, the depression was slightly less marked.

The vitamins (calcium pantothenate, niacin, thiamine and biotin) also lower the susceptibility of the mosquitoes—as much as 8-fold (niacin). With niacin and calcium pantothenate this depressive effect, or resistance, is greatest with intermediate concentrations of the vitamin; but biotin and thiamine increase their effect progressively with increasing concentration. Ascorbic acid, however, increased susceptibility but only at intermediate concentrations. Increased concentration then reversed the trend of increasing susceptibility until no effect by this vitamin was apparent at its highest concentration.

With pyridoxine hydrochloride low concentrations produced a 2-fold decrease in susceptibility. As the concentration was increased, this effect was lessened and eventually eliminated so that treated and control mosquitoes showed no significant difference in oöcyst counts. Further increase of the concentration, however, then induced greater susceptibility up to about 3 times normal. And, finally, still further concentration resulted in a reversal of this rising susceptibility again towards the normal level found in the control mosquitoes. Inositol also exhibited this biphasic effect but, in contrast to that of pyrodoxine hydrochloride, its low concentrations increased susceptibility and its higher concentrations depressed it.

Of the mammalian hormones, ACTH induced a progressively decreasing susceptibility with increasing concentration but there was a sharp reversal of this effect—which was as great as 8-fold—at the highest concentrations used, to the extent of eliminating the effect altogether. Insulin and thyroxin induced increasing susceptibility with little or no change in the trend as concentration increased.

The plant hormones, indole-3-acetic acid and β-naphthaoxyacetic acid, also produced greater susceptibility which increased progressively with increased concentration. The latter hormone is noted as preventing the development of the parasite beyond oöcysts to sporozoites. This is also known for aureomycin and terramycin.

The maximum concentration tested for these compounds is usually the maximum tolerated dose for the mosquitoes: the concentrations are expressed as percentage values. For penicillin a concentration of 1,000 units per ml. is considered arbitrarily as 0·1 per cent. concentration of penicillin. [The concentrations of the percentage values for the other compounds are obscure although, for each, the relative strengths are understandable.]

In discussion, it is suggested that the susceptibility and resistance, or innate immunity, of mosquitoes is the result of several interacting factors or "systems" within the host mosquito, certain compounds influencing these factors selectively in one direction until a level toxic to the mosquito is reached. Or, as for pyrodoxine hydrochloride and inositol, a biphasic action develops with increasing concentration of the compound due to differential effect at different critical levels of the substance in the mosquito.

D. S. Bertram

Draper, C. C. **Observations on the Reciprocal Immunity between some Avian Plasmodia.** *Parasitology.* 1953, May, v. 43, Nos. 1/2, 139–42.

Four strains of *Plasmodium relictum* (coming respectively from Germany, Algeria, Paris and Italy), *P. relictum* var. *matutinum*, *P. elongatum*, *P. hexamerium* and *P. rouxi* were maintained in female canaries, chiefly by blood passage, though mosquito transmission was effected in *Culex molestus*

in the case of the Algerian, Parisian and Italian strains of *P. relictum*. In this way, a stock of birds with chronic infections was accumulated and these were exposed to cross-infection with one or more of the heterologous strains or species of parasite, usually by inoculation of heavily infected blood, or occasionally by mosquito bite. The degree of immunity was measured by observing the parasitaemia for a month, and was expressed as "strong" (no visible parasites), "moderate" (33 per cent. parasitaemia as compared with control), "slight" (33–66 per cent. parasitaemia) and none (66–100 per cent. parasitaemia).

The results were clear-cut: there was nearly complete reciprocal immunity between the strains of *P. relictum*, and rather less between them and var. *matutinum*. After mosquito infection cross immunity was slightly less. The Algerian and Italian strains were nearest, the New World variety the furthest in immunological relationship. Reciprocal immunity between *P. elongatum* and the other species was absent, and was negligible between *P. hexamerium* or *P. rouxi* and the others. There was a small degree of immunity between *P. hexamerium* and *P. rouxi*. These findings are in contrast to mammalian malaria where there is usually little antigenic relationship between strains of the same species of parasite.

P. C. C. Garnham

Paraense, W. L. Observações sôbre uma amostra brasileira do *Plasmodium circumflexum*. [**Observations on a Brazilian Strain of** *Plasmodium circumflexum*] *Mem. Inst. Oswaldo Cruz.* 1952, Mar., v. 50, 211–28, 1 graph & 30 coloured figs. on pl. [21 refs.] [English version 299–41.]

This is the first record of *Plasmodium circumflexum* for Brazil, where it was found in a new avian host, a grackle—*Gnorimopsar chopi chopi*, from which 10 canaries were experimentally infected and provided the material for the study of the life-history of this parasite. The asexual cycle of the Brazilian strain has a periodicity of 24 hours (as compared with 48 hours reported for other strains), and is highly synchronized. Segmentation of the schizonts takes place regularly at noon every day, giving rise to 6 to 22 merozoites (mean 13·5±2·44). Gametocytes are produced periodically, when segmentation of the schizonts occurs, reaching a maximum number about 2 days after the peak of parasitaemia. The host-cell nucleus is displaced only in a minority of cells harbouring mature schizonts or gametocytes. The merozoites show a definite predilection for immature erythrocytes. Exo-erythrocytic stages were observed only in two birds which died 15 and 17 days respectively after inoculation. The morphology of the parasite is described in detail and beautifully illustrated in a coloured plate.

C. A. Hoare

TRYPANOSOMIASIS

Pinto, A. R. A capacidade de cultura do *T. gambiense*. [**Culturability of** *T. gambiense*] Reprinted from *Bol. Cultural Guiné Portuguesa.* 1952, Apr., No. 26, 239–42, 2 figs. on pl.

After a short review of the methods used for the cultivation of *Trypanosoma gambiense* and of the results obtained by previous workers, the author describes observations carried out by him in Portuguese Guinea in which Brutsaert and Henrard's modification of the Razgha-Reichenow medium,

and Henrard's modification of Weinman's medium [see PINTO *et al.*, below] were used.

Among the 30 sleeping sickness patients who provided the material for this study, 10 were in the primary stage of the disease, 8 in the secondary, and 12 in the tertiary. Search for the presence of trypanosomes was made by blood culture, and by microscopical examination of the juice of lymph glands and thick blood films. The results were positive in 29 cultures, 27 gland juices and 8 blood films. In 7 cases trypanosomes were detected by all the three methods, in 26 by culture and in gland juice, in one by culture and in blood film.

It is concluded that the strains of *T. gambiense* from Portuguese Guinea are readily cultivated, and that haemoculture represents a valuable diagnostic method for sleeping sickness. *C. A. Hoare*

JACKSON, C. H. N. **A Mixed Population of** *Glossina morsitans* **and** *G. swynnertoni*. *J. Animal Ecology*. 1953, May, v. 22, No. 1, 78–86, 1 fig.

The greater part of the paper deals with a population of *Glossina morsitans* and *swynnertoni* which occurred in an area of about a quarter of a square mile of thorn bush in Northern Tanganyika. The population of each species, measured by Jackson's method based on marking and recapture [this *Bulletin*, 1948, v. 45, 874], was a few hundred to the square mile. The figures are studied in a technical way which can only be appreciated by those who have followed this interesting but specialized work.

On the technical side one observes that the conventional "fly round" planned to traverse a variety of types of vegetation is not used. In its place the author followed an "angular spiral" which prevents the entomologist choosing his path. He therefore samples the bush in a more random and less personal way. An ingenious method has been evolved for marking very large numbers of flies individually, so that if a fly is recaptured there is no need to give it a second paint mark. The paint marks may be applied to 14 positions on the upper aspect of the thorax; 9 colours are used, two at a time, and over 25,000 individual flies have been marked without duplication. *P. A. Buxton*

PINTO, A. R., PARREIRA, F. & FRANCO, A. A mielocultura na doença do sono. [**Bone-Marrow Culture in Sleeping Sickness**] Reprinted from *Bol. Cultural Guiné Portuguesa*. 1952, Apr., No. 26, 245–7.

The cultivation of bone-marrow was used by the authors with the view of testing its value as a method for the diagnosis of sleeping sickness. For this purpose they used Henrard's modification of Weinman's medium, which was prepared as follows: 4 cc. amounts of agar solution (3 gm. agar per litre of saline) were placed in test-tubes; after sterilization, 2 cc. of citrated human blood were added to each tube, the blood in each of 4 tubes being from a different donor.

The material for cultures was obtained by sternal puncture from 8 patients in different stages of the disease, in whom trypanosomes were previously detected in gland juice or in thick blood films. It consisted of 5 cc. bone-marrow juice and fragments mixed in the syringe with 1 cc. of 1 per cent. "Liquoïde Roche" (sodium polyanethyl sulphonate): 1 cc. of this mixture was inoculated into each tube of medium, and the results were assessed 10 days later by microscopical examination of a drop of culture.

These marrow cultures revealed trypanosomes in 7 out of 8 patients, indicating that this method promises to be of diagnostic value.

C. A. Hoare

BURTT, E. **Attenuation of Virulence of** *Trypanosoma brucei* **correlated with Loss of Salivary Gland Infection by a Tsetse-Fly.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, May, v. 47, No. 3, 246–7.

This seems to be the first recorded observation of the loss by a tsetse-fly of its salivary gland infection with polymorphic trypanosomes. The presence of the trypanosomes in the salivary glands of fly no. 24 (*Glossina morsitans*) was shown, on November 26, 1948, by inducing the fly to "probe" with its proboscis on a microscope slide, and also by its bite producing infection of a white rat and a rabbit. Both animals recovered from the infection which lasted for about 2 months in the rat and for a few days only in the rabbit. The fly failed to infect a golden hamster and another rat on December 9 and 11 and died on December 13, 1948. In 4 "proboscis-probings" after the diagnostic one, no trypanosomes were found in the ejected saliva. At the time of this observation and since, this strain of trypanosomes (Shinyanga I) has produced many fatal infections of laboratory animals through the bites of *G. morsitans*.

The author regards this as an example of the varying resistance among tsetse-flies to infection with polymorphic trypanosomes. *J. F. Corson*

ROUBAUD, E. & GHELELOVITCH, S. Essai sur le pouvoir infectant naturel des *Glossina palpalis* de la région de Yaoundé (Cameroun Français). (2e note). [**Study of the Natural Infecting Power of** *Glossina palpalis* **in the Yaoundé Region, French Cameroons**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 268–70.

The authors received some 200 *Glossina palpalis palpalis* from Yaoundé, Cameroons. They studied the trypanosome infections by allowing the insects to bite susceptible animals, and by dissection.

The flies transmitted *T. congolense* to a goat. Of 160 dissected (males and females nearly equal in numbers), only 3 flies were found infected, each with *T. congolense*. The authors feel that these [surely rather meagre] figures support the view that *T. congolense* is the dominant trypanosome in the suburbs of Yaoundé. [For previous work on these lines, see this *Bulletin*, 1950, v. 47, 606.] *P. A. Buxton*

DAVIS, Betty S. **Studies on the Trypanosomes of some California Mamals.** *Univ. California Publ. Zoöl.* 1952, v. 57, No. 3, 145–249, 12 charts, 4 figs. & 9 pls. [Numerous refs.]

RAMOS, A. da S. Inquerito epidemiológico sôbre a moléstia de Chagas em Santa Rita do Passa Quatro. (Estado de São Paulo.) [**Epidemiological Survey of Chagas's Disease in Santa Rita do Passo Quatro, São Paulo, Brazil**] *Folia Clin. et Biol.* S. Paulo. 1952, Aug., v. 18, No. 2, 99–108, 1 map & 1 fig.

The English summary appended to the paper is as follows:—

"This paper is a result of a survey on Chagas' disease in the county of Santa Rita do Passa Quatro, São Paulo State, Brazil.

"The researches were done on 33 farms in order to see the occurrence of the bugs so called 'barbeiros' (Sub-fam. *Triatominae*), and the collecting of blood samples for the serological Machado Guerreiro test.

"Three species of Triatominae were found: *Triatoma infestans*, *Triatoma sordida* and *Panstrongylus megistus*.

"The only species which was found infected by the *Schizotrypanum cruzi* was the *Triatoma infestans* that shows 4 examples with the infection.

"The blood samples were taken in the 12 places of the county where operated the Postos de Assistência Médica Sanitária (Unity of Medical Attendance) of the Serviço de Higiene Rural (Hygiene Rural Service).

"Among the 190 blood samples taken, 28 or 14·9% showed positive results to the Machado Guerreiro Test; 135 or 72·3% were negatives; 8 or 4·3% doubtful; 16 or 8·5% were anticomplementary; 3 or 1·58% were lost."

Di Primio, R. Habitação rural à prova de *Triatoma*. [**Triatoma-proof Dwellings in Country Districts**] *Rev. Med. Rio Grande do Sul.* 1952, Jan.–Feb., v. 8, No. 45, 120–26, 8 figs. English summary.

Apart from social and economic conditions, poverty, dirt and lack of education, the chief factor in the prevalence and spread of Chagas's disease is bad housing, where the people live in "ranchos," mud huts infested with Triatomidae. Exclusion of these insect vectors is easy when houses can be build of stone and wood which does not split and is impervious to the bug.

This article is of practical importance to builders engaged in erecting dwellings in the rural districts inhabited by the poor and ignorant. The remedy consists in the replacement of mud huts by moulded blocks of masonry, cement, lime and concrete. The actual selection depends on trial of resistance to damp and to cracking, In this contribution, instructions are given as to the size of the blocks, methods of joining and cementing joints, sealing the angles of the rooms, etc. Such dwellings will not only exclude Triatomidae but will be useful to the people socially and educationally.

H. Harold Scott

LEISHMANIASIS

Fusaroli, A. Primo caso autoctono di leishmaniosi viscerale verificatosi nel Comune di Forli. [**First Autochthonous Case of Kala Azar Confirmed in Forli District (Italy)**] *Riv. Italiana d'Igiene.* 1953, Jan.–Feb., v. 13, Nos. 1/2, 6–17, 1 map. & 2 figs. [15 refs.]

The English summary appended to the paper is as follows:—

"The author reports on the first case of autochthonous Kala-Azar (*Visceral Leishmaniosis*) in the communal district of Forli, where cases of Oriental Sore have been recently simultaneously reported. Attention is drawn on accurate researches on carrier insects of the zone.

"Considering the clinical course of the reported case the author recommends that in all cases of fever, enlargement of the spleen and anaemia which may occur in the region, spleen puncture smears should be done."

Trager, W. **The Development of** *Leishmania donovani in Vitro* **at 37°C. Effects of the Kind of Serum.** *J. Exper. Med.* 1953, Feb. 1, v. 97, No. 2, 177–88, 6 figs. on pl. [17 refs.]

In this paper an account is given of attempts to grow *Leishmania donovani* in the leishmanial stage at 37°C.

For this purpose suspensions in nutrient broth were prepared from infected spleens of hamsters (for leishmanial forms) and from cultures (for leptomonad forms). The culture medium consisted of (a) extracts of human

or rabbit erythrocytes in a diluent containing solutions of NaCl, KCl, $NaH_2PO_4.H_2O$, K_2HPO_4, $NaHCO_3$, glucose, $CaCl_2$, $MnSO_4.4H_2O$, and (b) serum from rabbit, hamster, guineapig or man. The cultures were prepared in 50 ml. Erlenmeyer flasks, each containing 3 ml. of red cell extract, 0·6 ml. of serum, and 0·4 ml. of leishmania suspension. The flasks were kept at 37–38°C., and a current of 95 per cent. air plus 5 per cent. CO_2 was passed through them by means of inlet and outlet tubes. The culture fluid was changed every 2nd day.

In the medium containing human erythrocyte extract and human serum leishmanias from hamster spleen gave rise to intermediate aflagellate forms, which resembled the leishmanial stage or rounded leptomonads, after 1–2 days; they multiplied during the first 4 days, and then died out. Some flagellated leptomonads also appeared in this medium. Leptomonads from cultures kept at 28°C., when placed in the same medium at 37°C., survived for about 4 days, some retaining this form, others losing their flagellum. In the case of both types of the parasite, a similar effect was produced when human serum was substituted by hamster serum, but not by rabbit serum. It was found that addition to the medium of nicotinamide (400 mgm./100 ml.) prevented the development of intermediate forms from leishmanias and killed the leptomonads.

It was thus shown that it is possible to grow *L. donovani in vitro* and extracellularly at 37°C., with the production of an intermediate stage between the intracellular leishmania and the leptomonad form. The failure to induce the development of the true leishmanial stage is probably due to the absence of some other environmental requirements. *C. A. Hoare*

Heisch, R. B. & Guggisberg, C. A. W. **Notes on the Sandflies (*Phlebotomus*) of Kenya.** *Ann. Trop. Med. & Parasit.* 1953, Mar., v. 47, No. 1, 44–50, 1 map. [13 refs.]

Locality records are given for 18 species and varieties of *Phlebotomus* occurring in Kenya and the Omo river region of southern Abyssinia. The commonest and most widespread species are, in order of prevalence, *P. bedfordi* var. *congolensis*, *P. bedfordi*, *P. schwetzi* and *P. clydei*.

Tree holes seem to be their usual habitat but specimens have been caught in earth holes and in tents and other buildings. No sandflies were caught on oiled-paper traps placed near earth cracks. A list giving the numbers of specimens of 8 species found in tents and houses shows that the most numerous were *P. squamipleuris*, *P. clydei*, *P. bedfordi* and *P. bedfordi* var. *congolensis*. *P. bedfordi* var. *congolensis* and *P. schwetzi* have been caught biting man.

Kala azar has been contracted in the Omo river region of southern Abyssinia and 2 endemic foci are known in Kenya and others are suspected. The question of the vector species is discussed but there is as yet no positive evidence. *P. clydei* is regarded as a possibility for, though it is outside the *major* group and has not yet been caught biting man in Kenya, it has a fairly wide distribution, is taken in fairly large numbers and it enters tents and huts. *H. S. Leeson*

Dostrovsky, A., Sagher, F. & Zuckerman, A. **Isophasic Reaction following Experimental Superinfection of *Leishmania tropica*.** *Arch. Dermat. & Syph.* 1952, Dec., v. 66, No. 6, 665–75, 6 figs. [Refs. in footnotes.]

The leishmanin test, an allergic skin test analogous to the tuberculin test, becomes positive a few days after infection with *Leishmania tropica* and

remains positive for the remainder of the patient's life. On the other hand, immunity to oriental sore does not develop as long as parasites are present in the lesion, although once fully developed it also persists for life. Again, the leishmanin test gives a positive reaction with weaker solutions in the presence of relapsing lesions (recidiva) than in the presence of the primary lesions (nodosa). Thus, hypersensitivity and immunity do not appear to run parallel.

A series of experiments were undertaken to attempt to superinfect patients with the leishmaniasis recidiva form of oriental sore and to study any lesions that resulted.

Six patients with relapsing lesions, in none of which was leishmania demonstrated by smear but in all but one by culture, were inoculated intradermally with 1,000,000 flagellates from a culture taken from one of the patients. In 4 patients a papule surrounded by erythema developed in 48 hours, as in the leishmanin test, but practically disappeared within a month. At the end of 6 weeks a reddish-yellow infiltration developed. At the end of 6 months the infiltrated area had extended and the lesion was about 0·75 cm. in diameter and typically a recidiva lesion with in some cases the typical " apple jelly " nodules was to be seen if the lesion was viewed through a glass slide pressed against it. To 5 of the 6 patients a further inoculation of 10,000,000 parasites was given 1 to 5 months after the first. Similar but slightly larger lesions were produced.

Biopsy sections of the lesions as early as 37 days and as late as 200 days showed typical tuberculoid tissue.

Attempts to demonstrate circulating antibodies in the blood of the patients were negative.

The lesions produced by all these subinoculations were in every way similar to the relapsing lesions (leishmaniasis recidiva) of oriental sore; they were preceded by a very transitory nodular phase (leishmaniasis nodosa).

The authors conclude that, since the intradermal test was positive in all these patients and yet in nearly all the immunity was insufficient to prevent reinfection, allergy and immunity are two separate processes.

L. E. Napier

SNAPPER, I. **American Mucocutaneous Leishmaniasis successfully treated with 2-Hydroxystilbamidine.** *Amer. J. Med.* 1952, Nov., v. 13, No. 5, 655–64, 4 figs. [27 refs.]

" A protracted and stormy illness in a young American woman, contracted after a prolonged sojourn in the jungle areas of Ecuador, was characterized by fever, chills, mucocutaneous ulcerations and gangrenous ulceration of the chest wall. Treatment with many antibiotics and finally radiotherapy were without effect on the fever, local lesions or general condition. On admission the patient was critically ill, with fever, noma-like gangrene of the chest wall, osteomyelitis of the clavicle, splenomegaly, leukopenia, granulocytopenia and hyperglobulinemia.

" Smears from the ulcer surface demonstrated the presence of Leishman-Donovan bodies but bone marrow smears were negative. Montenegro's test for leishmaniasis was positive.

" The diagnosis of American mucocutaneous leishmaniasis was made and the patient treated with 2-hydroxystilbamidine to a total of 6·1 gm., with remarkable recovery. The gangrene healed completely, and after spontaneous extrusion of a small sequestrum the osteomyelitis of the clavicle healed, leaving a soft pliable scar. Splenomegaly disappeared and the total blood count and serum globulin returned to normal.

"It is emphasized that 2-hydroxystilbamidine has the same leishmanicidal action as stilbamidine but that the disagreeable side actions of of stilbamidine—trigeminal neuropathy and renal toxicity—are not caused by the 2-hydroxy compound."

FEVERS OF THE TYPHUS GROUP

YAMAMOTO, T. & SUZUKI, K. **Effect of P-Aminobenzoic Acid and some Antibiotics on Rickettsial Toxicity for Mice.** *Japanese J. Exper. Med.* 1952, Aug., v. 22, No. 4, 325–31, 2 figs.

The authors describe a method by which they think it may be possible rapidly to assay, or at least to screen, the rickettsiostatic activity of certain drugs. They estimated the potency of the drugs in neutralizing *in vitro* the toxic effect of doses of *Rickettsia mooseri* which killed mice within 6–24 hours by intravenous inoculation.

The results observed were found to be "fairly well parallel" with those obtained by the usual method of testing the drugs by finding their power of protecting animals against death from infection caused by smaller infecting doses of the rickettsiae. The proposed method took less than 24 hours as compared with 10 or more days needed with the usual method.

The findings appeared also to correspond with clinical experience of the relative value of the drugs; aureomycin was the most effective, next best was chloramphenicol, then penicillin, and last of all para-aminobenzoic acid. *John W. D. Megaw*

See also p. 865, Fox, **Notes on the Cat Flea in Puerto Rico.**

LABOCCETTA, A. C., ISRAEL, H. L., PERRI, A. M. & SIGEL, M. M. **Rickettsialpox. Report of Four Apparent Cases in Pennsylvania.** *Amer. J. Med.* 1952, Oct., v. 13, No. 4, 413–22, 6 figs. [12 refs.]

"1. Four patients with clinical and laboratory findings compatible with rickettsialpox, apparently incurred in metropolitan Philadelphia, are reported.

"2. Clinical and serologic evidence for the diagnosis included eschars in three patients, rashes and constitutional symptoms, significant titers against washed and unwashed rickettsialpox antigen, and slight or negative Weil-Felix reactions."

[The authors point out that "absolute proof of the etiology of rickettsialpox has not been established in any of our patients". The first recorded case occurring outside New York City was reported in Boston, Mass., in 1950: see this *Bulletin*, 1951, v. 48, 546.]

YELLOW FEVER

GAST GALVIS, A. Fiebre amarilla en Colombia. Aspectos epidemiologicos durante los ultimos cuatro años. [**Yellow Fever in Colombia. Epidemiology during the past Four Years (1949–52)**] *Rev. Facul. de Med.* Bogotá. 1952, Dec., v. 21, No. 6, 241–57, 1 map & 2 graphs.

A résumé of this investigation was given at an Inter-American Congress held at Havana from the 26th September to 1st October, 1952, so that the

record would include only 9 months of 1952. The last urban epidemics of yellow fever in Colombia took place in Bucaramanga in 1923 and in Socorro in 1929, transmitted by *Aëdes aegypti*, and in September and October, 1937, there was a "small outbreak" in Buenavista, a village at the confluence of the Magdalena and La Miel rivers. The woods around Buenavista swarm with *Haemagogus spegazzinii falco* and sylvatic yellow fever has repeatedly been shown to exist on the banks of the La Miel river. In Buenavista itself *Aëdes aegypti* abounds and may be seen in every dwelling. Ten cases were notified in 2 months, but which mosquito transmitted the infection cannot be stated, as both were so numerous.

The type of infection has been rural and sylvatic and most cases were at 400–800 metres above sea-level; viscerotomy specimens taken from patients dying after an illness of 10 days or less showed that the patients were isolated cases in different localities at the same time. In the wooded zones monkeys are plentiful, but where the areas have been cleared for cultivation monkeys are scarce but marsupials abound and they may be the reservoir hosts of the virus. In 1947 and 1949 cases occurred at Pavarandocito and at Pácora, which are distant from each other 350 kilometres.

Judged from viscerotomy records, males are infected more than females at all ages except in the 5–9-year group and here the differences are not statistically significant. The preponderance of males over females is specially marked in the 20–29-year group, where among 2,210 males 200 (9·04 per cent.) were positive and only 12 among 1,396 females (0·86); altogether among 18,888 males 484 (2·6) were positive and among 15,112 females 41 (0·27); and of the total 34,000 there were 525 (1·54) positive.

A graph of cases recorded during the period 1934–52 indicates that the prevalence runs in cycles with rises every 4–6 years; the maximum occurred in 1947 with 77 cases, the minimum in 1949 with 3 only. The virus was isolated from 26 persons between 1935 and 1951, the youngest was a boy of 14 years and the oldest a woman of 43 years; of the 26, 19 recovered and 7 died. Cases begin to increase in number towards the end of the rainy season and progress during November–January; thereafter the numbers fall as the dry season ends and the rains begin.

Coming more particularly to recent years: in 1949 there were 3 cases; in 1950 there were 12, including a small outbreak at Mocoa, the capital of Putumayo. Five deaths occurred, 3 other patients recovered and showed specific antibodies in their blood. They were engaged working in the woods. Periodicity is again evident here, because in the preceding 5 years no case had been recorded. In 1951 numbers continued to rise and 26 cases were discovered, 2 by isolation of the virus and 24 by pathological findings. Half of these came from a region known to be endemic for yellow fever; in 1952 there were 12. Speaking generally, the foci are all in the mountainous zones of the interior of the country; there is distinct periodicity in the annual incidence while endemicity is evident by sporadic occurrence of small outbreaks.

A table gives details—locality, name, age, date of disease, date of death and means of diagnosis, nearly all by the histopathology of the liver—of each of the 53 cases proved during the 4 years 1949 to 1952.

The author adds a final note that in places where it was possible to keep up the campaign for constant vaccination yellow fever had disappeared. [A most interesting and carefully prepared paper.] *H. Harold Scott*

i. Levi-Castillo, R. Die Epidemiologie des Buschgelbfiebers in der Küstenebene von Ecuador. [**Epidemiology of Jungle Yellow Fever in the Coastal Areas of Ecuador**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Mar., v. 4, No. 2, 254–65, 5 figs. [13 refs.]

ii. ——. Estudios epidemiológicos sobre la Fiebre Amarilla Selvática en las Provincias de Manabí y Esmeraldas de la zona costera de la República del Ecuador. *Rev. Kuba Med. Trop. y Parasit.* 1952, Oct.–Nov.–Dec., v. 8, Nos. 10, 11 & 12, 76–81, 6 figs.

i. In spite of an active campaign for the eradication of yellow fever in Ecuador, started in 1946, there was a fresh outbreak in 1951, when 53 cases, 19 of which ended fatally, occurred in the low land region of Santo Domingo de los Colorados; mostly lumbermen and people working in the woods were infected. The virus was probably carried by monkeys of various species among which an epizootic outbreak of jungle yellow fever is recorded, spreading rapidly and extending from Central America to the coastal plains of Ecuador. The transmitting insect is *Haemagogus spegazzinii*. Its larvae often breed in the internodial hollows, and stumps of bamboo stems and cannot be reached by antilarval measures. Habitats and behaviour of *Haemagogus*, of which very little was known so far, are described in detail. The vaccination of all persons working in the limits of the virgin jungle has been made compulsory as the best preventive measure.

[This paper should be read in full by those interested.]

ii. This is another account of the same outbreak. *B. G. Maegraith*

See also p. 858, Lewis, **The *Stegomyia* Mosquitoes of the Anglo-Egyptian Sudan.**

See also p. 858, Lumsden and van Someren, **Records of *Culex* Species (Diptera: Culicidae) from West Nile District, Uganda, with Notes on their Behaviour.**

Hahn, R. G. & Bugher, J. C. **The Stability of Chick Embryo Yellow Fever Vaccine during Storage.** *J. Immunology.* 1953, Apr., v. 70, No. 4, 352–8, 1 fig.

This study, made in Lagos, Nigeria, presents the results of titrations in mice of several batches of yellow fever vaccine stored at approximately 0°–4°C. for periods of 5–7 years. The vaccine, which consisted of the 17D strain of virus, was prepared by the Rockefeller Foundation Laboratories in New York City. All batches were titrated for virus content one month after desiccation, and thereafter at intervals of 6 months to a year.

The data show clearly that at the end of one year of storage the titres dropped by 1·5 to 2·0 logs below that of the titre of the original vaccine pulp. Thereafter there was only a slight further decline in potency during the following 5 years. [These observations have been amply confirmed by unpublished studies made by workers at the Entebbe laboratory.]

It is pointed out that in order to evaluate a batch of vaccine several ampoules in the batch should be titrated individually in order to detect the presence of any with a low titre (resulting from an error in technique) which might be masked if several ampoules are pooled.

In general it has been shown that desiccated vaccine preparations can be made in quantity which will maintain a satisfactory titre for immunization

during prolonged periods of storage at 0°–4°C. The equation for the rate of deterioration suggests a system composed of a mixture of particles of many different decay rates which could arise if the virus were aggregated in complexes of greatly varying magnitude. That such a state of aggregation may exist is suggested by experiments of BURRUSS and HARGETT [this *Bulletin*, 1947, v. 44, 994], who showed that after rehydration the titre of the vaccine may rise steadily to a maximum in about 1 hour or more at room temperature. It was for this reason that Hahn and Bugher selected a standard time of 20 minutes between rehydration and titration [which should be done in all laboratories engaged in the titration of yellow fever vaccine]. *G. W. A. Dick*

MACNAMARA, F. N. **Reactions following Neurotropic Yellow Fever Vaccine given by Scarification in Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, May, v. 47, No. 3, 199–208, 6 figs. on 3 pls. [25 refs.]

In 1951–1952 an epidemic of yellow fever broke out in Southern Nigeria and neurotropic yellow fever vaccine was used as a method of control. Desiccated mouse brain vaccine supplied by the Pasteur Institute, Dakar, was used, except in a few cases in which a chick embryo preparation only one passage removed from Dakar vaccine was employed.

The reactions which resulted from the vaccinations are classified as "mild," "viscerotropic" and "neurotropic." The "mild" reaction was associated with pyrexia for 1 to 2 days, starting on the 4th and 5th day after vaccination. The patients sometimes complained of headache, and less often of backache and abdominal discomfort. In 4 groups studied 60, 62, 45 and 46 per cent. had febrile reactions of 99°F. or over (mouth temperature) on the 6th day after vaccination. While mild reactions following the administration of neurotropic yellow fever vaccine by scarification have been recorded in 20–30 per cent. of those vaccinated (PELTIER, 1948, *Proc. 4th Int. Congress Trop. Med. Malaria*, v. 1, 489) [LAIGRET, this *Bulletin*, 1947, v. 44, 580]; Macnamara's figures are very much higher. [This may be attributed to the fact that a temperature of 99°F. may be attained by a certain proportion of normal subjects in tropical climates.]

A number of persons exhibited jaundice, vomiting and albuminuria after vaccination, but since an epidemic of yellow fever had been in progress in the area, it cannot be concluded that these "viscerotropic" reactions were not, in fact, natural yellow fever infections.

Of great importance were the "neurotropic" reactions. STONES and Macnamara are to report an outbreak of encephalitis after vaccination. [Presumably the unpublished report is to refer to the incidence of encephalitis in Southern Nigeria.] Macnamara states that in Eastern Nigeria cases were comparatively frequent. An incidence in children of 3–4 per 1,000 vaccinations is recorded, with a case fatality of 40 per cent. Adults were also affected, but at a lower rate. The incubation period varied from 9 days to over 3 weeks. Most of the subjects developed symptoms 10–13 days after vaccination. Some patients had fever and headache for 1 or 2 days before the onset of encephalitic signs and symptoms, others exhibited convulsions, irritability, disorientation, aphasia or slurred speech. Convulsions were common, sometimes occurring every hour. Sequelae were rare, but 2 cases of residual paresis and mental deterioration are recorded. Five of the fatal cases were brought for autopsy within one hour of death. All showed a similar pathological picture characterized by small areas of focal neurosis, cuffing of blood vessels and congestion. Virus shown to be that of the

yellow fever vaccine was isolated from 3 of 4 brains on which tests were made. [The evidence for this is to be presented by Stones and Macnamara.]

The use of neurotropic yellow fever vaccine has been suspended in Nigeria.

G. W. A. Dick

CHOLERA

PAOLETTI, A. Pleiomorfismo del vibrione colerico e corpi nucleari. [**Pleomorphism of** *Vibrio cholerae* **and the Cell Nucleus**] *Giorn. di Batteriol. e Immunol.* 1952, Nov.–Dec., v. 45, Nos. 1/2, 34–45, 3 figs. [41 refs.] English summary (3 lines).

This investigation was undertaken to try to determine the significance of the different morphological forms which *Vibrio cholerae* can assume, and also to obtain definite evidence regarding the presence or absence of a cell nucleus. To provide material for the study, strains of *V. cholerae* were grown on plain nutrient agar of *p*H 8·2 to 8·4, or on nutrient agar, *p*H 8·0, containing 1·5 per cent. of lithium carbonate. After a period of adaptation the strains gave good growth after 24 hours on the plain agar, and for the first 48 hours of incubation the culture consisted exclusively of typical comma-shaped bacilli. After 2 days, round and spherical forms began to appear, and their numbers increased with time, while the typical forms gradually diminished. After 15 to 20 days very few bacillary forms were present, and after 30 to 40 days the cultures contained only round and spherical forms. Fusiform and pin-shaped forms were also seen in some cultures.

Adaptation to the lithium carbonate agar was less complete. Incubation for 3 to 4 days was needed to produce good growth, and the bacillary forms were already scanty by the end of the second day. In addition to round and spherical forms there were also spirillary forms of varying length in the relatively early days of incubation, but after 8 to 10 days only the spherical forms could be seen.

From these observations the author concludes, in agreement with previous workers, that the round and spherical forms occur when growth conditions are unfavourable. He does not consider that there is sufficient evidence to decide whether they are more resistant than the normal form to adverse environments.

Typical vibrios which were unquestionably in the early stages of development were obtained in the following way. Culture medium was seeded heavily from old cultures which consisted entirely of round and spherical forms, and the new cultures were examined at 2-hour intervals. Vibrios first began to appear at the end of 4 hours' incubation, and they steadily increased in number thereafter with a proportionate decrease of the aged forms. Observation showed that the rounded forms first assumed a quadrangular shape, then became sausage-shaped, and these forms increased in length and finally developed into typical vibrios.

Actively-growing bacteria contain a high proportion of ribonucleic acid which stains deeply and masks any other elements present in the cell. It can, however, be destroyed by hydrolysis without affecting the deoxyribonucleic acid of which nuclei are largely composed. When the different forms of vibrios were treated in this way and then stained, the rounded forms were seen to contain a distinct round nucleus, and the fusiform types

showed an elongated axial nucleus. Spirillary forms as a rule lacked a nucleus, but some of the very large ones had a nucleus which followed the curves of the organism. No nucleus could ever be demonstrated in actively-growing vibrios. The author suggests that, during this phase, the deoxyribonucleic is transformed into a soluble material which spreads throughout the protoplasm and plays some essential part in the metabolism of the cell. As the growth phase reaches its close the nuclear material is changed back, and then condenses into a visible nucleus. Soon afterwards the vibrios begin to show the morphological changes associated with aging cultures.

J. C. Broom

CHAUDHURI, R. N., GHOSAL, S. C., MONDAL, A. & CHAKRAVARTY, N. K. **Treatment of Cholera with Oral and Intravenous Chloromycetin.** *Indian Med. Gaz.* 1952, Oct., v. 87, No. 10, 455–9.

The comparative value of oral and intravenous administration of chloramphenicol was tested in two groups of 20 cholera patients, a third group of 20 serving as controls. The tolerated dose of chloramphenicol by mouth was found to be 4 gm. administered over 48 hours. The intravenous dosage used was 0·5 gm. as an initial dose followed by 3 doses of 0·25 gm. at 6-hour intervals. High blood levels were very rapidly obtained by intravenous administration but no untoward reactions were observed. Of the cases initially giving positive stool cultures 92 per cent. of those used as controls were still positive after 24 hours. The figures for those receiving oral and intravenous chloramphenicol were 55 per cent. and 50 per cent. respectively, with reduced numbers of colonies. At the end of 48 hours the stools of all receiving oral chloramphenicol and 13 out of 14 receiving intravenous chloramphenicol were negative. In the control group 55 per cent. were still positive at 48 hours. One of the intravenous group remained positive to the 13th day. Diarrhoea stopped on the average period of 2·7 days in the chloramphenicol-treated patients compared with 4 days in the controls. The case mortalities for controls, orally-treated and intravenously-treated patients were respectively 15 per cent., 20 per cent. and nil. The groups were small and the differences may not be significant. More extensive trials would be necessary to determine the real value of intravenous administration of chloramphenicol in the treatment of cholera. [For previous work by the authors on this subject, see this *Bulletin*, 1951, v. 48, 255.] *J. Taylor*

DAS, A., GHOSAL, S., MONDAL, A. & GUPTA, S. K. **Terramycin in Cholera** *J. Indian Med. Ass.* 1953, Apr., v. 22, No. 7, 268–71.

Following on a preliminary trial [this *Bulletin*, 1952, v. 49, 691] of terramycin in the treatment of cholera, in which it had been observed that though the stools were sterilized within 24 hours there was no significant reduction in case mortality as compared with controls, a second series of very early cases was treated. A considerable proportion of the patients were admitted within 6 to 12 hours of the onset of the attack and alternate subjects received terramycin treatment or served as controls. The usual saline transfusion treatment was also given.

The results in cases giving positive cultures of *V. cholerae* in the stools, which consisted of 190 treated patients and 82 controls, are analysed. The case mortality in those treated with terramycin was 11·6 per cent., compared with 18·3 per cent. for the controls. In those treated within 6 hours of onset and in controls admitted within the same period, the case mortalities were respectively 4·3 per cent. and 8·5 per cent. The corresponding

figures for patients within 6 to 12 hours were 20·3 per cent. and 30 per cent. These differences were found not to be statistically significant. It is concluded that oral terramycin has no additional advantage in the clinical management of a case of cholera.

Of the 190 patients whose stools were positive before treatment only 18 gave positive cultures on the 2nd day, 2 on the 3rd day and 1 on the 4th day, after which the results of the examination were negative. Out of the 82 controls who were positive on admission to hospital, 62 were positive on the 2nd day, 45 on the 3rd day, and 20 on the 4th day, the numbers dropping to 7, 4 and 2 on the 5th, 6th and 7th days. The vibriocidal activity of terramycin became manifest within 6 to 24 hours of antibiotic treatment. The administration of terramycin was not found to reduce the amount of saline transfusion necessary for fluid replacement. *J. Taylor*

Das, A., Ghosal, S. & Gupta, S. K. **Intravenous Terramycin in Cholera.** *J. Indian Med. Ass.* 1953, Apr. v. 22, No. 7, 272–3.

In the course of clinical trials in cholera by oral administration of terramycin it had been observed that traces only of the antibiotic could be detected 6 hours after administration in 3 out of 18 cases. It was thought that with the rapid escape of plasma fluid into the intestinal lumen which occurs in the disease, intravenous injection might result in more rapid appearance.

In a series of 20 patients treated intravenously, with 16 controls, no significant difference in case mortality was noted. The stools when examined 2 hours after administration of terramycin showed no bactericidal action. At 6 hours there was also no marked reduction in the number of colonies obtained on plating although the estimation of terramycin in 10 samples of stools collected showed a concentration of 4 to 16 μgm. per ml. in 6. Previous *in vitro* studies had shown terramycin to be vibriostatic at 2 to 5 μgm. per ml., but the level found had apparently not been effective, possibly because the period of contact was insufficient. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Montestruc, E., Blache, R. & Martin de Mirandol, P. Les protozoaires intestinaux parasites de l'homme à la Martinique. [**Intestinal Protozoal Parasites in Man in Martinique**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 188–91.

The authors have examined many specimens of faeces in Martinique (11,000 in 1951), but it was not practicable to make stained preparations of more than a few.

They now report the examination of 482 specimens specially stained by a modified iron-haematoxylin technique (which is described in detail).

The results are shown in a table, which indicates that amoebae were found in 234 specimens (48·5 per cent.) and flagellates in 46 (9·1 per cent.). While *E. histolytica* was found in only 6 specimens (1·2 per cent.), *E. coli*, *E. nana* and *I. bütschlii* were found respectively in 76, 98 and 54 specimens, representing 15·7, 22·4 and 11·2 per cent. Of the flagellates, *Giardia* was

found in 40 specimens (8·3 per cent.) and *Trichomonas* in 6 (1·2 per cent.). *Balantidium coli* was found only once and there is the remarkable claim that *Eimeria stiedae* [a very rare parasite in man] was found in one specimen. Multiple infections were not uncommon, for there were 4 species of protozoa in 1 specimen, 3 species in 21 and 2 in 31.

The authors feel that the modified iron-haematoxylin method used was not superior to examination of fresh or iodine specimens in the case of the flagellates and ciliates.

They note the rarity of *E. histolytica*, in Martinique, which confirms previous routine experience, and add that this parasite appears, in Martinique, to be rarely a cause of clinical dysentery, which is more frequently due in that area to salmonellae and shigellae or to *S. mansoni*.

On the other hand, the non-pathogenic amoebae were present in nearly half the specimens, and in a percentage far greater than that of any of the helminth infections commonly found in Martinique (*Trichuris* were 20 per cent., hookworm 18·6, *Ascaris* 18·5 and *S. mansoni* 4·7 per cent. in 1951).

They suggest that these amoebae may play some part, in association with pathogenic parasites, protozoal and helminthic alike, in causing digestive, nutritional or blood conditions. In support of this, they observe that they have often noted that symptoms of a local or general nature in such carriers have cleared up after orthodox anti-amoebic treatment.

H. J. O'D. Burke-Gaffney

LANCASTER, H. O. **An Amoebic Survey of Australian Soldiers during the Second World War.** *Med. J. Australia.* 1953, Apr. 18, v. 1, No. 16, 552–3.

As pathologist in a military hospital on the lines of communication from New Guinea in 1943, the author was able to survey intestinal parasitic infections in nearly all those admitted to hospital. The helminth studies have been reported already [this *Bulletin*, 1944, v. 41, 950, 951, 969] and the present study deals with protozoa.

The sample was regarded as representative of the army population. The records are divided according to service in (a) Middle East and New Guinea; (b) Middle East only; (c) New Guinea only; (d) Australia only; and (e), later, included former prisoners-of-war from Malaya.

The results are given in a table in respect of findings for *E. histolytica*, *E. coli*, *Endolimax*, *Iodamoeba* and *Giardia*. *E. histolytica* was highest in those who had served in the Middle East only (10·5 per cent. of 95) or in New Guinea as well (9 per cent. of 346). It was found in only 4·1 per cent. of 592 who had served in New Guinea only, but was 7·5 per cent. in the 626 from Malaya. Clearly, service in the Middle East and Malaya raised the carrier rate. On the other hand, the percentage of *E. histolytica* in those who had served only in Australia was only 1·7 per cent. of 175, a figure which agrees with that of 1·3 per cent. given by BEARUP *et al.* (*Med. J. Australia*, 1949, v. 2, 7) for Australian troops who had never been abroad.

While amoebic dysentery was not rare in Australian troops abroad, it has not been common in the civilian population.

Local differences were less marked in the case of *Endolimax*, but occurred with *Iodamoeba*; the percentages in the 5 classes were 11·6, 14·7, 10·8, 5·1 and 12·5 respectively for the former, and 5·5, 5·3, 1·2, 0 and 1·9 for the latter. In the case of *Giardia*, the interesting point is made that it was not found in those who had been in New Guinea and in not more than 6 per cent. of those who had been in the Middle East or Malaya, indicating the

control of *Giardia* by mepacrine, which was taken regularly by those troops and to which this parasite is known to be susceptible.

It is emphasized that in this survey fresh and iodine preparations from single stools only were made as a routine. *H. J. O'D. Burke-Gaffney*

BHATTACHARJEE, B. & SIRCAR, P. **A Case of Amoebic Perforation of the Colon.** *Indian Med. Gaz.* 1952, Nov., v. 87, No. 11, 511–12, 6 figs. on 2 pls.

FUHRMANN, G. & KOENIG, K. Untersuchungen über die Resorptions- und Ausscheidungsverhältnisse von Resotren, Resochin und Yatren. [**Studies of Absorption and Excretion of Resotren, Resochin (Chloroquine) and Yatren**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Mar., v. 4, No. 2, 155–61.

It is recognized that from the soluble salts so far known, Resochin [chloroquine] base is practically completely absorbed in the small intestine. This explains its efficiency in extra-intestinal amoebiasis only. A certain fraction of the absorbed substance can be found in the urine. In the investigations reported the assumed complete absorption of Resochin base from the diphosphate led to an excretion in the urine of 12–22 per cent. (mean 16·7 per cent.) of the total oral dose. Resotren is the neutral salt of one molecule of Resochin (base) and two molecules of Yatren (acid); it is a stable compound of very low solubility. When it was orally administered in equivalent doses, only 4·6–11·5 per cent. (mean 8·3 per cent.) of the total amount of Resochin base could be found in the urine. The Resochin base component of Resotren was therefore absorbed only to the extent of about 50 per cent. The unabsorbed portion must remain in the lumen of the gut and can become effective later in the colon.

Yatren, absorbed from the sodium salt, is excreted in the urine in amounts ranging from 40 to 100 per cent. The lowest urinary excretions resulted from the presence of a concomitant diarrhoea. When Resotren was administered, only 16–41 per cent. of Yatren was excreted in the urine, even though diarrhoea was not present, or present to only an insignificant amount. Resotren, therefore, liberates only a part of the bound Yatren—a little less than 50 per cent.—for absorption. The remainder passes to the large intestine.

The conclusion is that in contrast to the behaviour of mixtures of Resochin diphosphate and Yatren sodium the corresponding amoebicidal components of Resotren are almost equally distributed intestinally and extraintestinally.

[This paper should be read in full by those interested.]

B. G. Maegraith

See also p. 793, GUNTHER, **Sidelights on Chloroquine: Two Cases of Interest.**

See also p. 856, SENECA and IDES, *In Vitro* **Action of Isonicotinic Acid Hydrazide on Protozoa.**

WELLS, W. H. & BUCKI, A. J. **Isospora Infection in Man.** *U. S. Armed Forces Med. J.* 1953, May, v. 4, No. 5, 769–72, 3 figs.

"A case of isospora infection in man is reported in which symptoms were probably due to an infection with *I. belli*. Although the parasite was first

demonstrated in specimens examined after the patient had arrived in the United States, the infection was probably acquired in Brazil."

VILLELA, M. P. & HELMEISTER, O. Emprêgo da metoquina na giardiose—verificação clínica e comparação por meio de exames de laboratório. [**The Use of Metoquine (Atebrin, Mepacrine) in Giardiasis**] *Arquivos Méd. Municip.* S. Paulo. 1952, Sept., v. 4, No. 3, 127–32.

There are 3 views on the effects of infection by *G. intestinalis* in man: i. that it is harmless; ii. that it is pathogenic, causing abdominal colic and attacks of diarrhoea, especially in children; iii. that it exists as a simple commensal but may become pathogenic when the nature of the intestine or its contents change.

The authors report 10 cases; 7 of the patients complained of abdominal pain or discomfort and diarrhoea; 3 had no symptoms; all were children between 6 and 9 years of age. They were given metoquine [mepacrine] in doses of 3 tablets, each of 0·1 gm., daily for 5 days, repeated after a fortnight's interval. It is difficult to assess the value of the symptoms, for all but one had other parasites as well and one showed in the faeces cysts of *Giardia*, cysts of *E. coli* and *E. histolytica* and *Endolimax nana*, and ova of *Trichuris trichiura*, *Ascaris lumbricoides*, *Enterobius vermicularis* and *Necator americanus*, and larvae of *Strongyloides*. In 8 the *Giardia* was not seen again after treatment, but as the other 2 were seen 5 and 10 months after, they may have been instances of re-infection. All tolerated the drug well. The 2 specially referred to had high fever when examined the second time and it is, therefore, probable that some cause other than the *Giardia* was present; in one this was certainly the case as *E. histolytica* was found in the faeces. *H. Harold Scott*

VILLELA, M. de P. & HELLMEISTER, O. Verificação clínica e analítica da violeta de genciana medicinal na giardiase intestinal—estudo de 21 casos. [**Gentian Violet in the Treatment of Intestinal Giardiasis. An Analysis of 21 Cases**] *Arquivos Med. Municip.* S. Paulo. 1952, Dec., v. 4, No. 4, 197–208.

The authors declare themselves on the side of those who maintain that *G. intestinalis* is a cause of intestinal disturbance, diarrhoea and colic, and they place on record the results of administering gentian violet in doses of 0·02 gm. thrice daily—on rising, half an hour before breakfast and half an hour before dinner—to 10 girls and 10 boys between the ages of 3 and 10 years. The course was one of 8 days, repeated after a week's interval. In an additional patient, reported as No. 21, intolerance was such, with nausea, vomiting and abdominal pain, that the drug could not be persisted with. Brief details are given of each of the patients and the results of faecal examinations before and after the treatment, and judged by the findings recorded, 5 of the boys and 6 of the girls were cured while 5 and 4 respectively continued to pass *Giardia*. It must be stated, however, that in the majority, 6 of the boys and 8 of the girls, other parasites, helminthic or protozoal, were present as well as the *Giardia*. Of the 20, exactly half were found to be no longer passing *Giardia* after the treatment, and of 15 who complained of abdominal symptoms, discomfort, pain, or diarrhoea, 11 no longer did so after the treatment. The authors conclude that gentian violet is useful as an adjunct in dealing with giardiasis in children.

H. Harold Scott

TENDEIRO, J. & PINTO, A. R., with the collaboration of F. GOMES. O *Balantidium coli* na Guiné Portuguesa. [*Balantidium coli* **in Portuguese Guinea**] Reprinted from *Bol. Cultural Guiné Portuguesa.* 1952, Apr., No. 26, 269–75, 1 coloured map & 4 figs. on 2 pls. [12 refs.]

A survey carried out on Bissau Island (Portuguese Guinea) in the course of 3 years (1949–51) revealed 4 cases of balantidial infection among 2,749 persons examined (0·15 per cent.), and 282 among 400 pigs (70·5 per cent.). The low incidence of human, as compared with porcine, infections confirms the relatively slight susceptibility of man to infection with *Balantidium coli.*

Inoculation (*per os* or *per rectum*) of cultures or faeces with human and porcine strains of the ciliate into experimental animals (baboons, *Cercopithecus*, rats and guineapigs) was successful only in the case of one baboon, which showed ciliates in its stools about a fortnight after rectal inoculation of a culture of the porcine strain. Two weeks later the infection disappeared. The ciliates were successfully cultivated in a number of media. *In vitro* tests made with conessine, milibis, aralen and hetrazan showed that only the first drug had an inhibiting effect on the growth of the ciliate. *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BOURGAIN, M., MOLLARET, L. & CHAMBRY, J. Survie de *Borrelia persica* Dschunkowski 1912, dans le sang total humain conservé à +4°C. [**Survival of** *Spirochaeta persica* **in Human Whole Blood Preserved at** +4°C.] *Ann. Inst. Pasteur.* 1953, May, v. 84, No. 5, 974–5, 1 graph.

The following is a translation of the authors' summary:—

The survival of *Borrelia* [*Spirochaeta*] *persica* in human whole blood kept at +4° is maintained for at least four days. It can continue up to the seventh day of refrigeration.

Refrigeration at +4° is no guarantee against infection by this parasite.

[See also this *Bulletin*, 1947, v. 44, 212, for similar results with organs of infected animals. In the case of human blood the significance is presumably related to blood transfusion.] *H. J. O'D. Burke-Gaffney*

HEISCH, R. B. & HARVEY, A. E. C. **Note on the Action of Terramycin on** *Spirochaeta duttoni* **in White Rats.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, May, v. 47, No. 3, 239–41.

The authors, from Kenya, refer to the work of BERKS and GOODWIN [this *Bulletin*, 1951, v. 48, 556] and of ADLER *et al.* [*ibid.*, 1952, v. 49, 698] on the experimental treatment with terramycin of laboratory rodents infected with *Spirochaeta duttoni* and *Sp. persica* respectively. In the light of the constant characteristics of *Sp. persica* set out by Adler *et al.* the present authors summarize 6 characteristics for the *Sp. duttoni* group.

They then record their own experiments with white rats infected with two Kenya strains of *Sp. duttoni.* The animals were given single intraperitoneal doses of terramycin varying from 25 to 100 mgm./kgm. on the 2nd or 3rd days when spirochaetes were numerous in the blood. Twenty rats, in groups of 5, and 15 controls were used in the case of each strain of spirochaete.

The results, which are tabulated, show that only 2 of the 40 infected rats treated with terramycin failed to relapse and both developed residual brain infections. However, treatment may have affected survival as 6 control rats died in the first attack, while all treated rats survived. Even the smallest doses cleared spirochaetes from the blood in 12–24 hours although relapses were not prevented.

Thirteen of the animals treated with the higher doses were tested for residual brain infections within 1–2 months and all were positive: 8 others, infected 2 to 8 months before, were similarly tested 1 to 3 weeks after an injection of 100 mgm./kgm.: but only 3 were positive which suggests that some occult infections may have been eradicated.

The authors note that relapses and residual brain infections were not prevented even with 4 times the dose found effective by Berks and Goodwin. They speculate on this and suggest that these drug tests should be used against spirochaetes which had been isolated fairly recently, as continuous passage may modify virulence and affect the results. Their own strains were 1 and 4 years old respectively.

H. J. O'D. Burke-Gaffney

YAWS AND OTHER TREPONEMATOSES

RAMANARAO, P. V. **Studies in Yaws (Koya Rogam). A Review of 1,000 Cases of Yaws from Warangal District, Hyderabad State (Deccan).** *Indian Med. Gaz.* 1952, Oct., v. 87, No. 10, 437–44, 15 figs. on 2 pls. & 1 graph.

The author worked in 3 *talugs* (subdivisions) of Warangal District, namely, Yellandu, Paloncha and Burgampahad, much of which is forest. The largest tribe in the area is the Koya and *Koya rogam* is their name for yaws. Yaws occurs in 4 other districts of Hyderabad, namely, Karimnagar, Adilabad, Mahabubnagar and Nizamabad. In the villages in the Yellandu and Paloncha *talugs* the percentage incidence of yaws (a clinical study only was made) varied from 4 to 6·5, and 94 per cent. of the yaws patients were Koyas.

"Usually the attention of the Koya is drawn to a profuse skin eruption and ulceration in the case of children in the secondary stage." In adults the complaint is of joint pains, chronic ulcers, skeletal and joint deformities with pain, and painful foot yaws which interfere with walking. In advanced stages patients are bed-ridden and crippled with emaciation, either with serpiginous and multiple ulcers or skeletal involvement.

Primary lesions were found in 52 patients. In 23 the lesion was on the lower limb below the knee and in the others it was on exposed parts of these semi-naked people. Primary lesions occurred in the following age-groups: 1–4 years 7; 5–9, 5; 10–14, 4; 15–19, 5; 20–24, 7; 25–30, 7; 30–39, 12, and over 40, 5.

Secondary lesions were seen in 241 patients and were most frequent in the age-group 1–14 but there is a slight increase of incidence in the 25–34-year group. Symptoms associated with secondary skin lesions include emaciation and anorexia, and glandular enlargement. Six infants under 6 months of age were observed with secondary yaws; the youngest, 3 months of age, contracted the infection from a yaws lesion on the mother's nipple which had been present two months before the child developed lesions.

Tertiary yaws was seen in 707 patients and was most frequent in the 30–40-year group; no patient was seen under 3 years of age. The most frequent symptoms were joint pains without disability. "Next in order . . . is the 'foot yaws,' papillomatous nodular outgrowths from the sole of the foot, on the toes, and on the medial and lateral borders of the foot." [From the description of these they appear to be secondary lesions.] Scaling, pitting and fissuring of the palms and soles, classed as "scaly dermatitis," occasionally associated with pigmentary changes, occurred in 15 per cent. of tertiary cases. Ulcers were nearly as frequent. Synovitis and arthritis with ankylosis or contractures were found in 7 per cent. Periostitis, periosteal nodes, osteitic bony nodes and sabre tibiae were present in 7 per cent. Goundou was seen in 1 patient and gangosa in 6. In tertiary cases 2 or more types of lesions were often present in the same patient. No eye, cardiovascular or nervous system affection was seen. No post mortem was carried out.

Arsenical and bismuth preparations were mostly used in treatment. Contact is the most important factor in transmission and a history of contact is often obtained. The Koyas live in small groups of 4–10 huts in thick jungle. The climate in the forest areas is very warm and moist in the rainy season and at other times it is hot and dry. The altitude is 200–500 ft. [60–170 m.] and the average annual rainfall is 30 inches [76 cm.]. The Koyas are a semi-naked people, uneducated, unclean, superstitious and backward. Their nutritional condition is poor. No venereal disease is seen among them but yaws has been with them for "ages past." The author suggests that this area offers opportunities for investigation into yaws. There are several tables and a graph showing the frequency of cases of primary, secondary and tertiary yaws in age-groups.

[The earlier part of the graph, especially for the tertiary cases, is flattened since the figures are for 5-year periods, whereas from 30 years onwards the figures are for 10-year periods. The paper is an interesting rough clinical study of yaws in a part of the world where yaws is not well known. The author says that he was, at the start, not well acquainted with the disease and has not read much about it.] *C. J. Hackett*

LEPROSY

LEPROSY IN INDIA. 1953, Apr., v. 25, No. 2, 55–180, 7 figs. (1 coloured) on 2 pls., 4 charts & 15 graphs. [51 refs.] **Fourth All-India Leprosy Workers' Conference, 1953, Puri.**

This was the 4th annual All-India Conference to be held under the auspices of the Hind Kusht Nivaron Sangh (The Indian Leprosy Prevention Society) and its Orissa Branch. This time it was held in a particularly suitable place, for, as the Governor of Orissa pointed out in his inaugural speech, 1 out of every 70 persons in Orissa has leprosy. It is calculated that there are in this State 170,000 people with leprosy, and that probably 67,000 of them are infectious. It is even mentioned that this may be an understatement. Another figure quoted was that more than 15,000 children in India are freshly infected with leprosy every year. This same speaker said: "Segregation in village isolation centres is to be preferred to institutional segregation, firstly, because the cost would be very much less;

secondly, because the patients will be within easy reach of their families and will not be oppressed by the sense of isolation and exile; and, thirdly, because the village will become leprosy conscious." The Chairman of the Conference, Sri Devadas GANDHI, a son of the Mahatma, in his opening address stated that the leprosy problem demands the closest collaboration between official and non-official agencies, and that leprosy work should be placed high up in the priorities of the national programme. He also said that the number of persons suffering from leprosy in India is believed to be 2 million. Neglect could mean that in a few years the figure might go up to 3 million. [The number estimated some 15 years ago was 1,200,000.]

Speaking of a report that leprosy might be made a cause for divorce in the projected Hindu Marriage Act, Dr. DHARMENDRA asked: "Why of all infective diseases single out leprosy? This discriminative treatment is likely to have a baneful effect on the anti-leprosy work in the country. If it is permitted to take shape, most of what we have been doing during the past several years in our attempt to reorientate and rehabilitate the opinion of the public, so that they come to adopt a rational attitude towards the disease, will be undone."

There were 190 delegates to the conference from within India, 4 from Burma, and 1 from Indonesia.

Several interesting papers were read and discussed, the subjects dealing with both the medical and the social aspects of leprosy.

The Indian Association of Leprologists held its conference at the same time, and 2 of the technical sessions were joint meetings of the 2 bodies.

Ernest Muir

SCHMID, E. E. & THILLAINATHAN, P. **On the Specificity of Luotest in Leprosy.** *Ceylon J. Med. Sci.* (Sect. D.) 1953, Feb., v. 8, Pt. 3, 171–6 [18 refs.]

Luotest is a preparation obtained from syphilitic rabbit testes, which Rottmann and others claim as giving specific results in the diagnosis of syphilis when it is used in a skin test. The test is done by injecting 0·2 ml. intradermally and reading after 24 or 48 hours.

The authors tried the test in 175 leprosy patients, of whom 144 were without clinical signs or history of syphilis or yaws. Of the 144, there were 69 lepromatous, 69 neural, and 6 mixed. There were far more positive luotests among the neural than among the lepromatous cases (13 as compared with 5), the latter type influencing more the sero-reactions for syphilis. After the luotest there were more reversals from sero-positivity to sero-negativity than in the opposite direction, and there were more of these reversals in the lepromatous type than in the neural. *Ernest Muir*

CHAUSSINAND, R. Classification de la lèpre. [**Classification of Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 252–60.

This form of classification has 2 parts, a primary and a secondary. The primary divides leprosy into 2 types, benign and malignant; while the secondary classification again subdivides the benign into tuberculoid and indeterminate: the malignant has only the one form, the lepromatous. Each of these, the tuberculoid, the indeterminate and the lepromatous, may be either cutaneous or neural. In other respects the classification is very similar to those generally in use at present. *Ernest Muir*

BESSUGES, J. Quelques observations de traitement de la lèpre par la diamino-4-4′-diphénylsulfone dans la région sanitaire du Moyen-Ogooué (Districts de Lambarène et de N'Djole). [**Some Observations on the Treatment of Leprosy with DDS in the Sanitary Area of Moyen-Ogooue (Districts of Lambarene and of N'Djole)**] *Méd. Trop.* Marseilles. 1953, Jan.–Feb., v. 13, No. 1, 50–56, 2 figs.

DDS was used in the treatment of 162 cases of leprosy in French Equatorial Africa, of which 15 were lepromatous, 106 tuberculoid, 29 indeterminate and 12 mixed. The clinical improvement was remarkable and astonishingly rapid, especially in the lepromatous form, and in patients with ulcers and with reactions. Other diseases, especially malaria and intestinal infections, had often to be treated before DDS therapy could be begun, and such supplements as iron, folic acid and vitamin B_{12} had sometimes to be given. Notes are given of 10 particularly remarkable cases. In order to ensure that patients remain regularly under treatment for a long enough time, they should be kept in agricultural colonies. *Ernest Muir*

YOSHIE, Y., TAKEDA, Y., KOSHIRO, Y. & HATTORI, T. **Chemotherapy of Leprosy with Di-(P-Hydra-zinophenyl) Sulfone.** *Japanese J. Exper. Med.* 1952, Aug., v. 22, No. 4, 317–23, 1 text fig. & 6 pls. [25 refs.]

This derivative is synthesized "by introducing the hydrazino-radicals in place of the amino-radicals at the para-positions of D.D.S." The study was applied to 5 nodular and 2 macular cases of leprosy. They were given daily doses of 30 to 50 mgm. No serious ill results were noted. Absorption of infiltration and nodules occurred within 2 to 3 months, and bacilli in the nasal discharge diminished or disappeared after 3 or 4 months. While good results were obtained in the nodular cases no conclusion was reached in the macular cases because so few were treated. *Ernest Muir*

FLOCH, H. & HORTH, R. La vitaminothérapie B_1 dans la lèpre (névrites lépreuses). [**Vitamin B_1 Therapy in Leprosy (Leprous Neuritis)**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 262–7.

The authors have used vitamin B_1 for some years in leprous neuritis without effects. They consider that vitamin D_2 and vitamin C may be of some value in tuberculoid reactions, and should be used in high dosage. They find vitamin PP of use particularly as a preventive given along with DDS, with the purpose of preventing tuberculoid reactions which may be induced by DDS treatment. *Ernest Muir*

ROGERS, L. **The Reduction of Leprosy Incidence by Isolation of Infective Cases; combined with Six-Monthly Surveys of all Contacts to detect New Cases in an Easily Curable Stage.** *Indian Med. Gaz.* 1952, Nov., v. 87, No. 11, 528–30.

This is an account of the plan recommended in 1922 and 1925 for controlling leprosy by isolation of infectious patients and examinations of contacts at intervals of 6 months for 10 years. The results are recounted of this plan when used in Nauru Island, the Southern Sudan, South Africa and South-Eastern Nigeria. The use of this plan in India in selected areas of high incidence is recommended. A preliminary educative campaign is necessary in the trial areas, so as to convince the patients of the greater chance of recovery now that the sulphones are clearing up many cases

which were intractable before, and of the importance of their children and families being safeguarded from infection by their isolation. *Ernest Muir*

TANIMURA, T. & NISHIMURA, S. **Experimental Study on the Chemotherapy of Leprosy. (I) Efficacies of the Drugs upon Murine Leprosy.** *Med. J. Osaka Univ.* 1953, Jan., v. 3, No. 4, 675–84, 6 figs.

The results are given of controlled experiments on young rats which were inoculated with suspensions of murine leproma diluted 2,000 times, and treated with various drugs. Among the most important of these were chaulmoogra oil, promin, cepharanthin, and thiosemicarbazone. The only one of these which had any effect on murine leprosy was chaulmoogra oil, which was found to restrain the onset of the disease, the weight of the nodules produced in the chaulmoogra-injected rats being much less than that of the nodules of the rats which received no chaulmoogra.

The promin was given in two experiments. In the second of these it was given as subcutaneous injections, a 30 per cent. solution being injected in daily doses of 0·3 cc. six days a week, for 20 days. As the animals could not stand this, the dose was reduced to 0·1 cc. three days a week. The rats had been inoculated with rat leprosy 115 to 268 days before the treatment was begun. Only 7 of the 17 rats used survived the last injection, the rest dying of cachexia, pneumonia and other diseases. [This method of experimentation and the results obtained should be compared with the work of MAURI *et al.*, abstracted in this *Bulletin*, 1952, v. 49, 412.] *Ernest Muir*

TANIMURA, T., NISHIMURA, S. & KONO, M. **Experimental Study on the Chemotherapy of Leprosy. (II) Study on Chemical Agents and the Conditions which may influence their Efficacies.** *Med. J. Osaka Univ.* 1953, Jan., v. 3, No. 4, 685–94. [10 refs.]

This paper compares the results obtained in the treatment of leprosy by sulphones with those obtained with thiosemicarbazone. It then goes on to give the concentrations obtained of promin and promizole in blood and urine in various organs of the body, in blood cells and in blood plasma. Euglobulin in blood plasma absorbs neither promin nor promizole, but albumin is combined with both. In the discussion the authors say: "What interested us is that the drugs, like chaulmoogra oil or cepharantin, which stimulate the resistance of animals and produce favorable effects in the treatment, react in the same manner to both human and murine leprosy, when [*sic*] positively or negatively. While the chemical agents, such as sulfones and tibione, which seem to work directly upon the pathogenic organisms, behave differently against human or murine leprosy." *Ernest Muir*

HELMINTHIASIS

RIBEIRO, H. M. Verminose na pedreira do Rio Grande. [**Helminthiasis among Quarry Workers in Rio Grande**] *Arquivos Méd. Municip. S. Paulo.* 1952, Dec., v. 4, No. 4, 182–8, 2 figs.

The author examined the faeces of 400 workers in the quarries of Rio Grande, 229 males, 171 females; 34 of the former and 18 of the latter showed no signs of parasitism; 14·0 and 10·5 per cent. respectively, or of

the whole 13·0 per cent. *Ascaris* was the most common infection, being present in 151 (65·8 per cent.) of the males and in 126 (73·6) of the females, or, together, 277 (69·25 [not 67·5]). *Trichuris trichiura* came next, in 79 (34·4) of the males and in 83 (48·5) of the females, or 40·5 per cent. of the whole; *Strongyloides* was found in 51 (22·2) and 41 (23·9) respectively, 92 (23·0) together, *Necator* in 38 (16·5) and 25 (14·6) respectively, together 63 (15·7). Amoebic infection was found in 66 of the males (with helminthic infection in all but 10) and in 56 of the females (all with helminthiasis), *i.e.*, in 28·8 per cent. of the males and 32·7 per cent. of the females, or 30·5 per cent. of the 400 examined. Other tables show the incidence of each of the helminths according to the ages of the patients; the infection was highest in the 5–15-year group. *H. Harold Scott*

Balthazar, A. de M. As parasitoses intestinais no Parque Infantil Ibirapuera. [**Intestinal Parasites in Inmates of Children's Institutions, Ibirapuera**] *Arquivos Méd. Municip.* S. Paulo. 1952, Dec., v. 4, No. 4, 189–96, 3 charts.

Examination of children in São Paulo early revealed the fact that innutrition and helminthic infestation generally were found to run *pari passu*. In the institution for which the present study was carried out obtaining faecal specimens was not easy; it might be possible to collect only 6 samples in a week. The author was able to examine 295 specimens from 241 children between 3 and 12 years of age. Of these, 129 (53·5 per cent.) were boys and 112 (46·4) were girls; among the former, 113 (87·6) were positive and 16 (12·4) negative; among the latter, 95 (84·8) were positive and 17 (15·1) negative. [In the text the percentages have been calculated in terms of the total of 241 children and are given as males 46·88 and 6·63, and females 39·41 and 7·05 respectively.]

Of the 295 specimens 37 only (12·54 per cent.) were negative and these were all from well-nourished children, and in those positive anthelmintic treatment was unavailing, at all events inefficient, until the general state had been improved by administration of iron and vitamins. The findings of the different parasites have been recorded peculiarly as numbers and percentages of the parasites themselves, 420 altogether in the 295 examinations made. In order, these are given as: *Ascaris lumbricoides* 134 (31·9 per cent.), *Trichuris trichiura* 83 (19·76), *Strongyloides stercoralis* 20 (4·76), *Necator americanus* 18 (4·28), *Hymenolepis nana* 9 (2·14), *Enterobius vermicularis* 5 (1·19), *Heterodera radicicola* 2 (0·47), *Taenia solium* 1 (0·23), *Giardia intestinalis* 66 (15·71), *E. coli* 52 (12·38), *E. histolytica* 24 (5·71), *Iodamoeba bütschlii*, *Chilomastix mesnili* and *Blastocystis hominis* each 2 (0·47). *H. Harold Scott*

Hellmeister, O. & Pereira, M. B. Enriquecimento em exames de fezes. (Considerações em torno de uma modificação da técnica de Faust.) [**On a Modification of the Faust Method for Faecal Examination**] *Arquivos Méd. Municip.* S. Paulo. 1952, June, v. 4, No. 2, 83–8.

The authors' method, based on that of Faust, consists in making a suspension of faeces, 1 in 10, with water and straining through gauze into a centrifuge tube and centrifuging for about 3 minutes at 2,000 r.p.m. and decanting the supernatant fluid. To the deposit is added sulphate of zinc, 33 per cent. strength, to one-third of the tube, and it is again centrifuged as before. The supernatant is decanted into another centrifuge tube, water

added to fill the tube, the whole shaken and again centrifuged, and the sediment examined.

In a table the authors show the results of examination (one slide only of each) of 100 samples by each of 5 methods: direct, Willis's, Rivas's, Faust's, and their modification of the last. Since in nearly every case the last two proved superior to the others, these only will be referred to here as comparing the modified method (B) with the original Faust (A). The results are expressed in percentages: *E. coli* 27 in A, 34 in B; *E. histolytica* 8 in A, 15 in B; *G. intestinalis* 26 and 28 respectively; *Ascaris lumbricoides* 13 and 22; *Necator americanus* 7 and 13; *Trichuris trichiura* 11 and 29; *Strongyloides stercoralis* 5 and 14; *Heterodera radicicola* 0 and 1; *Taenia solium* or *saginata* (not distinguished) 0 and 3, *Hymenolepis nana* 3 and 2. The total is expressed in the table as 100 by A and 161 by B, or in percentages as 62·1 and 100 respectively. *H. Harold Scott*

Coutinho, J. O. Nova técnica de preparo de antígeno de vermes adultos para a intradermo-reação na esquistossomose. [**Adult Worm Antigen for the Intradermo-reaction in Schistosomiasis**] *Folia Clin. et Biol.* S. Paulo. 1952, Aug., v. 18, No. 2, 121–4. [14 refs.]

The author makes reference to antigens now or recently used for intradermal tests of schistosome infections, such as extracts of the hepatopancreas of infected snails (Fairley and Williams, and Taliaferro), of adult worms (Khalil and Hassan), of cercariae and extracts of other trematodes (Hassan and Betasche with *Fasciola*, Culbertson and Rose with *Pneumonaeces*, Peres and Sobrinho with *Eurytrema*), etc. His own "new method" consists in washing the adult worms in physiological saline and distilled water, drawing off the water and adding acetone, 10 times the volume of the worms; on shaking, the supernatant fluid is at first opalescent, but after 2 or 3 washings [with acetone] it becomes transparent and is decanted; at laboratory temperature or in half an hour at 37°C. the acetone is evaporated, the worms become brittle and are triturated with a glass rod to a fine powder which is extracted in a water-bath at 56°C. [apparently in Coca's solution as a 1 per cent. suspension] for half an hour and a clear fluid is obtained. The whole process can be easily carried out in any laboratory.

With this, an intradermal test was performed on 20 patients with schistosome ova in their faeces; 13 gave a strong positive (3 plus), 4 less strong (2 plus) and 3 were weakly positive (1 plus). *H. Harold Scott*

Barbato, E. C. D. Pneumopatia e cor pulmonale cronico esquistossomóticos. [**Pulmonary Pathology and Cor Pulmonale in Chronic Schistosomiasis (mansoni)**] 112 pp., 34 figs. & 1 diagram on 19 pls. [294 refs.] 1952. Thesis—Fac. Med., Univ. São Paulo.

This is a professorial thesis for the chair of clinical medicine in the University of São Paulo. At the present day, says the author, medicine has passed from the stage of isolation and classification of diseases and description of their signs and symptoms and their causation to a more intensive study of the way in which these causes act and the disturbances of function to which they give rise. Thus, in pulmonary schistosomiasis we have already a fair knowledge of the symptomatology and attempts have been made to establish the pathological effects of the infection. Less studied is the physio-pathological aspect and this is the subject of the present thesis;

the action of the toxins produced directly by contact of the worms and their ova on the pulmonary tissue and, indirectly, the toxins from the disintegrating tissue itself. As for the heart, the actual presence of the parasite in that organ is a rare event and the effects on the heart are due largely to the progressive pulmonary lesions; in the author's words, his aim is the elucidation of certain aspects of the pulmonary (respiratory) physiopathology and the genesis of chronic pulmonary cardiopathy.

With these ends in view the author has made a detailed analysis of 42 patients, clinically and radiologically, by electrocardiograph and angiocardiograph, and by undertaking intracardiac catheterization and numerous tests of pulmonary function.

Histologically, the effects on the lungs are of two types: i. Granulomatous. In the centre of the granuloma is found one or more ova or residues of these, with a clear, halo-like necrotic area around it, the result of substances elaborated by the miracidia, and an agglomeration of lymphocytes, epithelioid cells, fibrocytes and plasmocytes. ii. Action on the smaller arteries, which may be focal or more widespread and diffuse with destruction of the intermedia and thickening of the intima, even to occlusion. Canalization may occur by new formation of vessels in the thickened walls. There is also a diffuse myocarditis, Fiedler's myocarditis, which is regarded by some as specific, with fatty degeneration of the fibres; others, however, do not look upon this as a specific of schistosome infection. More important are changes in the cavities of the heart, hypertrophy of the walls of the right ventricle and, fairly often, the right auricle. This, in many instances, is accompanied by dilatation of the cavity. Occasionally the left ventricle [L.V.] is hypertrophied, but not markedly; the left auricle [L.A.] is usually normal. The pulmonary artery may be much dilated and show patches of sclerosis. In the lungs the action is not specific, but is that common to other acute processes, an exudative, desquamating alveolitis.

The author divides his 42 cases into 2 groups: I, of 27 under treatment for the disease or some of its symptoms, 26 of them with pulmonary or cardio-pulmonary symptoms; II, of 15 "in good health and in full physical activity" [but 5 of these, he states, showed the same signs as those in the first group and 3 suffered from dyspnoea]. Some had cardio-pulmonary signs without any abdominal symptoms, though as a rule both were present together. Radiologically, 23 of Group I and 4 of Group II showed opacities of a granulo-filamentous character, especially at the bases and probably of vascular origin and unconnected with the granulomata referred to above; in a few, the middle lobe only might show these. The vital capacity of the lungs was reduced in 25 of group I and in 3 of group II, the maximum respiratory capacity was lowered in 17 out of 23 in I and in 5 of 14 in II. The oxygen consumption was tested in 24 of I; the findings were variable. In 8 it was decreased, in 4 the respiratory quotient was increased, in 4 the index fell; in 2 others there was no change. The alkali reserve was estimated in 20: it was increased in 2, diminished in 6, all of group I.

The physical signs in the heart are attributed to the pulmonary condition, notably pulmonary hypertension. The right auricle [R.A.] showed, radiologically, an increase in size in 12 cases in I, but angiocardiography might reveal an increase not shown by simple radiography. The R.V. was enlarged in 18 of I and in 3 of II. There did not appear to be any correlation between enlargement of the R.A. and that of the R.V. Dyspnoea due to the cardiopathy was present in 19, palpitation in 18, especially with effort, praecordial pain in 2, cyanosis in 1 and oedema in 8. The apparent hypertrophy of the L.V. (apparent, that is, from the globe-like shape of

the heart and increase in transverse diameter) was really due to hypertrophy of the R.V. and raising of the diaphragm. If the L.V. was enlarged, this was chiefly associated with anaemia and anoxia; E.C.G. was usually normal; the few showing abnormalities are detailed. Agreement between the presence and intensity of the data from physical examination of the heart and radiology of the lungs was observed in 15 only of group I; the degree of dyspnoea corresponded with what was revealed by radiology of the lungs in 11, with that of the heart in 12, and with signs indicative of pulmonary hypertension in 8; but, it is stated, dyspnoea in schistosomiasis may be due to causes acting singly or in conjunction, and the oedema to cardiac weakness, to hypoproteinaemia and to anaemia. Loss of pulmonary elasticity is evidenced by reduced vital capacity and maximum respiratory capacity.

In his conclusions the author states that the predominating symptom in pulmonary schistosomiasis is dyspnoea and other signs of pulmonary hypertension; also due to the latter are the palpitation and praecordial pain. It differs from other forms of pulmonary cardiopathy in the absence of polyglobuly.

The thesis contains a scheme embodying the changes referred to and the interconnexions of them; this is more explanatory than pages of letterpress. There are a large number of tables giving details of the results of many tests and there are 34 figures, X-rays of the chest and electrocardiograms; but, unfortunately, there is no legend to any of them and to discover to which patient each belongs necessitates constant reference back and forth and even then the result is uncertain and after wandering to and fro like a Cretan in the labyrinth of Minos one has to give up the search for an exit. The thesis shows evidence of much careful work. *H. Harold Scott*

Pereira, O. A. & Netto, M. B. Esquistosomose pancreática. Aspectos clínico-patológicos. Apresentação de três casos. [*Schistosoma mansoni* **Infection of the Pancreas**] *Arquivos Brasileiros de Med.* Rio de Janeiro. 1952, Sept.–Oct., v. 42, Nos. 9/10, 311–34, 14 figs. [41 refs.] English summary.

Though several authors have recorded the presence of *S. mansoni* in the pancreas the condition is, nevertheless, looked upon as rare. The present authors, having had 3 such patients under their care, record them here and use them as a text for a general discussion on the clinical and pathological aspects of the subject. Incidentally, they state that several cases recorded simply as diabetes mellitus are very probably of schistosomal origin and quotations are given from the literature in support of this, the diabetic condition and the schistosomiasis both clearing up when antimonials have been given.

Very clear diagrams are produced of the anatomy and blood supply of the liver, pancreas and spleen, showing first why the liver is a common site and, second, when the portal vein is obstructed, how the pancreas may become involved, the worms blocking the venules and their ova being borne into the tissues. The lesions resulting from the presence of the worms and their toxins and the ova and their toxins are described in detail and illustrated by good photomicrographs and abundant references to the literature. The inflammatory reaction is fairly general although the distribution of the ova is localized.

The first patient, a woman of 26 years, suffered from diarrhoea, cyanosis, palpitation and dyspnoea with much pain in the umbilical region and the hypochondrium. She died 11 days after coming to hospital. The second

was a man of 28 years, with a history of fever, headache, diffuse abdominal pain, increased by taking food and radiating round to the back and made worse on deep breathing. Blood examination gave erythrocytes 2,640,000, leucocytes 12,100 per cmm., Hb. 44 per cent., C.I. 0·84, eosinophiles 7 per cent. Vomiting set in and he passed blood *per anum*, signs of peritonitis appeared and he died 13 days after admission. The third patient was a man of 28 years who died 5 days after admission. In addition to the pancreatic schistosomiasis the disease had affected the liver and lungs and he had a malignant tumour of the stomach with ascites and oedema of the legs. He was almost moribund when admitted. *H. Harold Scott*

VAUCEL, M. La thérapeutique des bilharzioses. [**Treatment of Schistosomiasis**] *Rev. Coloniale de Méd. et Chir.* 1953, June 15, v. 25, No. 214, 114–20. [18 refs.]
A general account and discussion.

DIAS, E. Nova possibilidade de combate aos moluscos transmissores das esquistossomoses. [**New Measures for Combating Molluscan Transmitters of Schistosomes**] 22 pp. English summary. 1953, Jan. Minas Gerais, Bambuí. Emprêsa Edit. o Eco.

A team of workers from the Instituto Oswaldo Cruz undertook an investigation into measures for dealing with the intermediate hosts of schistosomiasis in Bambui, Minas Gerais. As a preliminary they studied the snail concerned, *Australorbis glabratus*, and the numbers of them infected by the cercariae. The ordinary chemical and physical means for dealing with them not proving altogether satisfactory, the author went on to investigate the causes of death among Planorbidae and so to a study of the bacteria infecting them. Having isolated these [full details are not given, but information from the author suggests that they are of a new type] he tried various ways of increasing their potency and found a good one in the use of water containing the macerated bodies of snails which had been subjected to contact with the cultures. By inserting fresh snails each day and counting the numbers dying, the effect of the cultures could be ascertained.

An example is given. Seven days after the experiment of treating a snail-containing tank in the laboratory with cultures was started, of 315 snails 75 had died (23·8 per cent.); on the 11th day, 507 total and 200 dead (39·4); on the 15th day, 838 total and 491 (58·6) dead; on the 20th day, 1,448 total, 770 (53·2) dead. The "accumulated percentage dead" on these 4 occasions is stated as 23·8, 47·2, 68·8 and 69·4 respectively [how these figures are arrived at is not quite clear to the abstracter]. In another example even better results are recorded; totals on the 7th, 11th, 16th and 20th days being respectively 163, 326, 466 and 96, and the numbers dead 57 (35·0 per cent.), 143 (43·9), 373 (80·0), and 55 (57·3), and the accumulated percentages 35, 52·2, 86·0 and 93·9.

The method has not yet been tried in places known to be infested with these molluscs. Incidentally, it is said that the same bacteria are also inimical to mosquito larvae. *H. Harold Scott*

CHANCE, M. R. A. & MANSOUR, T. E. **A Contribution to the Pharmacology of Movement in the Liver Fluke.** *Brit. J. Pharmacol. & Chemotherapy.* 1953, June, v. 8, No. 2, 134–8, 1 fig. [12 refs.]

"1. A technique for the removal of the central ganglia in the liver fluke has been described and the action of drugs on this preparation has been compared with the whole animal.

"2. These preparations showed rhythmical movement when suspended under tension in Ringer solution. Carbaminoylcholine chloride, acetylcholine, and eserine affected the degangliated preparation in a similar manner to the normal, either producing paralysis of movement or reducing the amplitude of the contractions.

"The relaxing action of acetylcholine was temporary, but that of carbaminoylcholine chloride was long-lasting.

"Eserine sensitized the preparation to the effect of acetylcholine.

"3. The effect of the two choline esters was blocked by atropine or curare.

"4. Rhythmical activity of the preparations of the liver fluke was stimulated by some sympathomimetic amines. There is a close similarity between this action and the action of these substances as central nervous system stimulants in mammals.

"5. These results, when compared with published work on ascaris, show that these two parasites differ markedly in their reaction to the same drugs.

"6. Liver flukes have been found to contain an acetylcholine-like substance in amounts equivalent to 0·19–1·7 μg./g. (wet weight) of acetylcholine.

"The formation of an acetylcholine-like substance has been demonstrated *in vitro* in amounts equivalent to 4·0–12·7 μg./g. (wet weight) of acetylcholine in 1 hr. at 37°C.

"The presence of true cholinesterase and the absence of pseudocholinesterase in the liver fluke has also been demonstrated."

STUNKARD, H. W. *Raillietina demerariensis* **(Cestoda), from** *Proechimys cayennensis trinitatus* **of Venezuela.** *J. Parasitology.* 1953, June, v. 39, No. 3, 272–9, 4 figs. on pl. [31 refs.]

AMARAL, A. D. F. & PIRES, C. D. DE A. Algumas observações sôbre as himenolepíases humanas. [**Some Observations on Human Hymenolepiasis**] *Folia Clin. et Biol.* S. Paulo. 1952, Aug., v. 18, No. 2, 75–98, 1 map. [Numerous refs.] English summary.

This is a very clear account of infection by species of *Hymenolepis* in São Paulo: *H. diminuta*, *H. fraterna* and *H. nana*, but whether the last two are or are not identical is still undecided.

The authors, after reviewing the literature on the subject, record the results of examining nearly 600 persons in the São Paulo State Penitentiary. The faeces were examined by the zinc sulphate floatation method each on 6 occasions during the course of 3 weeks. Eleven of 592 examined showed evidence of infection, but they did not appear at all regularly. At successive examinations the numbers positive were 4, 2, 1, 1, 2 and 1. The last 5 figures refer to fresh positives; some of the 4 found on the first day were also positive on subsequent examinations, but not all, and if these are included the actual numbers found positive on successive days were 4, 5, 5, 5, 5 and 6. Treatment was not satisfactory; chloroquine, gentian violet, oil of chenopodium, thymol, metoquine [mepacrine] and carbarsone were tried but proved ineffectual. The most informative and valuable part of the paper is the table giving the State, and the locality in the State, where the examinations were made from 1911 to 1952, the authors reporting the results, the numbers examined and the percentages of these found positive; the figures refer only to findings in Brazil. *H. Harold Scott*

BENSTED, H. J. & ATKINSON, J. D. **Hydatid Disease. Serological Reactions with Standardised Reagents.** *Lancet.* 1953, Feb. 7, 265–8. [16 refs.]

"This communication is intended to redirect attention to the need for standardization of the reagents for both the hydatid complement-fixation and the intradermal tests" [in the diagnosis of human hydatid disease].

The paper is based on the results of serological reactions done as a result of the issue of 600 doses of antigen for the Casoni test by the Central Public Health Laboratory, Colindale. As a result of this preliminary investigation 62 cases were fully investigated, complement-fixation reactions were performed, and the final diagnosis was supported by the results of surgical procedures. Of 42 patients with hydatid disease occurring in Great Britain, one-quarter had lived in Wales, and half had visited the Middle or Far East.

The complement-fixation tests used are described in detail, with the experimental work on which they were based. In a historical review, the significance is stressed of FAIRLEY's original demonstration that the potency of an antigen in hydatid fluid is proportional to the number of scolices in the cyst [this *Bulletin*, 1922, v. 19, 671]. The tests were standardized by titrating repeatedly at intervals up to 2 years, various antigens against the same serum kept under sterile conditions at +4°C. In the second series of experiments, antibodies were produced in the blood of animals by the injection of antigen, and the serum was used as a standard reagent. Guineapigs were injected with ground-up scolices from fresh cysts. The serum of rabbits, though they are rarely infected with hydatid disease, is capable of fixing hydatid antigen. The sera of infected horses and sheep were found to contain no antibody. [The presence or absence of scolices in the cysts of such animals is not mentioned.]

The difficulties encountered in reporting the results of intradermal tests are discussed.

The results obtained by serological means and by surgical verification in 49 cases show that, by using the recommended techniques, 20 persons in whom both complement-fixation and intradermal reactions were negative were found to be suffering from conditions other than hydatid disease, and that of 29 who were proved to be infected with hydatid cysts, 27 had a positive complement-fixation test, and 25 a positive intradermal reaction.

W. E. Kershaw

MUHLEISEN, J. P. **Demonstration of Pulmonary Migration of the Causative Organism of Creeping Eruption.** *Ann. Intern. Med.* 1953, Mar., v. 38, No. 3, 595–600, 2 figs.

A case of creeping eruption is described in which filariform hookworm larvae, which were thought to be those of *Ancylostoma braziliense*, were found for 24 days in the sputum. The patient developed asthma one week after onset of the skin lesion. The larvae were previously generally believed not to migrate beyond the site of skin penetration. The patient did not develop intestinal hookworm infection. *W. E. Kershaw*

GALLIARD, H. & CHABAUD, A. G. Anomalies, s'éteignant par passage chez le chien, d'une souche de *Strongyloides stercoralis*, isolée d'un cas d'urticaire migrant. Comparaison avec différentes souches normales étudiées au Tonkin. [**Abnormalities Disappearing in Animal Passage in a Strain of *Strongyloides stercoralis* Isolated from a Case of Creeping Eruption in Tonking**] *Ann. Parasit. Humaine et Comparée.* 1952, v. 27, No. 6, 588–97, 1 fig.

Faecal cultures which were made from a patient suffering from creeping eruption gave rise to free-living adults of *Strongyloides* whose dimensions

were almost exactly double the normal size. Otherwise they were morphologically identical with *Strongyloides stercoralis*. The females contained 30 to 47 eggs in the uterus and the large numbers of larvae which appeared in the culture indicated an unusually high rate of oviposition. Passage of this strain of the parasite through dogs resulted, after the second passage, in a return to the normal dimensions of the free-living females and to a normal state of fecundity. *J. J. C. Buckley*

COUTINHO, J. O., CROCE, J., CAMPOS, R. & AMATO NETO, V. Estudo comparativo entre a pesquisa de larvas de *Strongyloides stercoralis* no suco duodenal e nas fezes. Valor diagnóstico. [**Search for Larvae of *Strongyloides stercoralis* in Duodenal Contents and in the Faeces compared**] *Folia Clin. et Biol.* S. Paulo. 1952, Aug., v. 18, No. 2, 125–31. [18 refs.] English summary.

Faecal examinations by the Baermann method and the results of duodenal intubation by Einhorn's tube were carried out on 67 patients in the hospital of the São Paulo University. The duodenal and faecal specimens were usually obtained the same day. The duodenal fluid was allowed to settle and the supernatant fluid and the deposit were examined separately, before and after centrifuging for some 5 minutes at 2,500 r.p.m. The larvae were found in the faeces in 38 and in the duodenal extractions in 24; in 14 the faeces were positive and the duodenal fluid negative; in no instance was the reverse of this found. The moral is that, if the larvae are not found in the faeces, it is useless to look for them in the duodenal juice.

H. Harold Scott

SEITZ, K. Epidemiologische Uebersichtskarte der Askaridiasis im Rhein-Main-Neckar-Gebiet. [**An Epidemiological Chart of Ascariasis in the Rhine-Main-Neckar Area**] *Med. Klin.* 1953, Apr. 24, v. 48, No. 17, 618, 1 map.

Much has been written about the disturbing increase of ascariasis since World War II, and conclusions based on studies of restricted areas have often been given general application. Such conclusions are only partially correct, because marked local variations of incidence occur and the incidence may be affected by the nutrition of the people and by the type of the soil.

The author studied the incidence of ascariasis in school children aged 7 to 14 and in a large number of the infants, in order to relate the average incidence to the total incidence in the area. The localized incidence is shown on a map. During 1949–1952 the author studied 426,508 children, among whom 112,248 (26·3 per cent. ±0·07) had eggs of *Ascaris* in their stools. Meanwhile the incidence was markedly reduced by energetic sanitation and by treatment, but the map gives an interesting view of the incidence in south-western Germany.

The map shows the 3 most heavily infected areas, namely, the known one of Darmstadt-Griesheim, the hinterland of Speyer and Schifferstadt and the interior of the Palatinate with the provinces of Pirmasen and Kaiserlautern. In all 3 of these heavily-infected areas the townspeople were less heavily infected. The heavy infection in all 3 areas is due, the author suggests, to manuring of vegetable crops with human faeces. It is known that in Griesheim it is also related to the Darmstadt sewage, but the causes of an incidence so high as that found in the Palatinate could not be discovered. The Rhine basin is relatively lightly infected, while the

neighbouring Mittelgebirge area is relatively more heavily infected. This the author ascribes to the fact that the soil of the Rhine basin is a readily-permeable, sandy soil which becomes relatively quickly free from *Ascaris* eggs, while in the wooded areas of Hessen, the Palatinate, Franconia and Baden, the soil is less permeable. The map shows clearly the influence of the supply of vegetables from the cultivated areas of Hessen, which extended to Lower Franconia. Middle Franconia, which provides its own vegetable supply, is relatively lightly infected. North Baden is peopled chiefly by an agricultural population, who were less affected by the war, and the land is not densely populated and the sanitation is more like that of the pre-war period.

The author concludes that random samples give only a limited indication of the incidence of ascariasis in a large area. The study of children of definite age-groups in larger areas gives a clear view of the situation as a basis for measures to be taken by the authorities. *G. Lapage*

MÜLLER, Gertrud. Untersuchungen über die Lebensdauer von Askarideneiern in Gartenerde. [**Studies on the Longevity of** *Ascaris* **Eggs in Garden Soil**] *Zent. f. Bakt.* I. Abt. Orig. 1953, Apr. 30, v. 159, No. 5, 377–9.

The author refers to the work of GÄRTNER and MÜTING [this *Bulletin*, 1951, v. 48, 904], who found that the number of *Ascaris* eggs in soil decreases so greatly during the first year that it must follow that they remain viable in the soil for not much more than 1 to 2 years. The author adds that, in view of this work, the current view that these eggs can live in soil for 5 to 8 years has been shaken. She therefore studied *Ascaris* eggs under conditions as near as possible to garden practice.

For 3 successive days in April, 1946, the author treated a vessel containing sandy earth with about 50 litres of effluent containing *Ascaris* eggs derived from a house in which 19 persons lived, one of whom had severe ascariasis and from whom treatment removed 300 ascarids. This vessel was then set aside and fenced off. In a garden treated with the effluent strawberries were planted and two persons (A and B), whose stool-examinations showed that they were not infected with *Ascaris*, ate 30 of the strawberries each year until 1952, *i.e.*, for 7 years. The strawberries were eaten while they were sandy and unwashed. During the earlier part of each year before the strawberries were eaten weekly examinations of the stools of persons A and B showed that no eggs of *Ascaris* were present. In 1947, the first year when the strawberries were eaten, person B had, about 4 weeks after eating the strawberries, asthma-like symptoms and in the following two weeks body-pains and vomiting. Ten weeks after eating the fruit, 2 ascarids were spontaneously voided and after castor oil 5 more were removed and 2 others after treatment with vermalin K; the stools then remained free from ascarid eggs. Person A had slight clinical symptoms, but, 9 weeks after eating the fruit, voided two ascarids spontaneously and the stools then remained negative.

In 1948 both persons had, 5 weeks after eating the strawberries, marked bronchitic symptoms. After 15 weeks A voided 1 *Ascaris* and the stools were then negative. After 10 weeks B had sudden, brief diarrhoea and voided two ascarids, vermalin K removing 3 more, the stools then becoming negative. In 1949 A showed negative stools throughout the year and was not infected. B showed ascarid eggs in the stools 10 weeks after eating the strawberries and after 12 weeks voided 2 ascarids, the stools then becoming negative. In 1950 a child aged 2, forbidden to play in the garden,

took, in March, sand from the strawberry plot with the object of eating it, her mother believing that eating sand is good for children. Eight weeks later the child was slightly jaundiced and had body-pains, and treatment removed 28 ascarids and some days later 12 more were voided, and 4 weeks later treatment removed 5 more. Person A had, 6 weeks after eating the strawberries, marked bronchitis, and B had, after 7 weeks, severe urticaria. In September of that year both voided one ascarid each.

In 1951 A had, after 6 weeks, asthma-like symptoms and B had urticaria and gastro-intestinal pains. In September each voided two ascarids. In 1952 A was not infected, and B passed 1 ascarid.

The author concludes that it can be said with some probability that *Ascaris* eggs can remain infective in soil for 6 years at least. In the seventh year (1952) only person B was infected and the number of eggs was reduced, so that the infectivity was lowered. In June each year 10 gm. samples of the soil in the surface layers of the experimental vessel treated with the sewage effluent were examined and it was found that each 10 gm. contained in the respective years, 30, 20, 10, 5, 3, 3 and 3 eggs. The 30 strawberries eaten each year had on them about 3 to 5 gm. of sand, so that in 1947, when the soil in the vessel contained 20 eggs per 10 gm. soil, each of the two persons had eaten about 10 eggs and in 1952 one or two eggs, figures which compared well with the number of worms voided. In addition the author studied eggs isolated in hanging drops and kept in an incubator till the larvae emerged from them. This study showed that larvae emerged from the eggs both in 1947 and also 7 years later, so that the eggs were infective for this period of time. The author does not think that the reduction of infectivity to the two persons who ate the strawberries was due to development of resistance against *Ascaris*. *G. Lapage*

VENKATACHALAM, P. S. & PATWARDHAN, V. N. **The Role of *Ascaris lumbricoides* in the Nutrition of the Host. Effect of Ascariasis on Digestion of Protein.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Mar., v. 47, No. 2, 169–75. [21 refs.]

It has frequently been observed, and is commonly accepted, that the presence of intestinal helminths impairs the nutrition of the host, especially in subjects already malnourished. The mechanism of this impairment is imperfectly understood. An investigation into the effects of infection with *A. lumbricoides* upon digestion and absorption of protein was conducted at Coonoor, South India.

Nine children, with *Ascaris* egg counts of more than 20,000 per gm. of faeces, were given, in hospital, a diet consisting only of reconstituted skim milk and ripe bananas, for 18 days. The daily protein intake (=8·30 gm. nitrogen in 7 cases) was constant for each subject throughout the period. Faecal nitrogen excretion was measured over 2- to 3-day periods before and 4 days after treatment with oil of chenopodium in castor oil. In no case were ova found in the faeces 72 hours after treatment. The average faecal nitrogen fell from 1·315 gm. per 24 hours before treatment to 0·711 gm. per 24 hours after treatment, a difference which is significant (p=less than 0·01).

Further investigations on uninfected and on untreated subjects excluded the possibility that the observed change in faecal nitrogen was due either to the direct effects of the anthelmintic and cathartic themselves or to an adaptation by the subjects to a higher level of protein intake than that to which they were accustomed. As the nitrogen content of *Ascaris* ova was

found to average 4·24 mgm. per million eggs, the fall in faecal nitrogen consequent upon the disappearance of ova from the stools would account for less than one-tenth of that actually observed.

Mainly on the grounds that none of their subjects had significant diarrhoea or abdominal disturbances, the authors reject intestinal hurry as the sole cause of impaired digestion and absorption and favour the view that *A. lumbricoides*, to protect itself from digestion, secretes one or more anti-enzymes capable of inactivating trypsin and possibly pepsin and thus interferes with the host's digestive process. [Bray (*Brit. J. Nutrit.*, 1953, v. 7, 3) was unable to demonstrate consistent changes in nitrogen balance after anthelmintic treatment of chronically malnourished Gambian boys infested with *A. lumbricoides* and *Ancylostoma duodenale*.] *Dean Smith*

Markowski, B. **Appendicular Obstruction by** *Ascaris lumbricoides*. **A Case Report.** *West Indian Med. J.* 1953, Mar., v. 2, No. 1, 85–6, 1 fig.

Report of a case in British Honduras.

Brounst, G. & Naffah, N. Un foyer de filariose au Liban. Traitement par le diéthylcarbamazine. Les résultats d'un essai de dépistage par l'intradermo-réaction. [**A Focus of Filariasis in Lebanon. Treatment by Diethylcarbamazine (' Hetrazan '). The Results of an Attempt at Diagnosis by the Intradermal Reaction**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 191–4, 1 fig.

A case of chylocele is described in a man of 24 years who had not travelled outside Lebanon. The fluid around the testis contained microfilariae of *W. bancrofti*. These were also present in blood taken at night. Three other members of the family were also infected, 2 were free. The 4 patients were treated with ' Hetrazan ', 150 mgm. 3 times daily for 7 days. Three were cleared of microfilariae after one course; the man with the chylocele was cleared after 2 courses.

A cousin and 4 members of his family were tested by a skin test. Four of them gave a positive reaction and 3 were then found to have microfilariae in the blood. None of these had ever left the country, but it is possible that they may have become infected by contact with African troops during the war. It is recommended that steps should be taken to investigate and eradicate this infection. *F. Hawking*

Augustine, D. L. **Filariasis in Tropical Asia.** *J. Indian Med. Ass.* 1953, May, v. 22, No. 8, 317–23, 2 figs. [28 refs.]

Jaswant Singh & Raghaven, N. G. S. **Filariasis as a Public Health Problem in India and its Control.** *Bull. Nat. Soc. India for Malaria & Other Mosquito-Borne Dis.* 1953, Jan., v. 1, 37–42, 1 map. [20 refs.]

" 1. An account of the prevalence, vectors and connected details regarding filarial infections in India has been set out.

" 2. The extent of prevalence and species of filarial infection are depicted in a map.

" 3. A short description of the methods of control of filariasis in India is set out, bringing out their relative merits and handicaps.

" 4. The public health importance of filariasis in India has been brought out."

Otto, G. F., Jachowski, L. A., Jr. & Wharton, J. D. **Filariasis in American Samoa. III. Studies on Chemotherapy against the Non-periodic Form of** *Wuchereria bancrofti*. *Amer. J. Trop. Med. & Hyg.* 1953, May, v. 2, No. 3, 495–516, 8 figs. [16 refs.]

As part of the study of the epidemiology and control of filariasis in American Samoa attention was paid to two microfilaricidal drugs—diethylcarbamazine (' Hetrazan '), given by the mouth, and sodium thiacetarsamide (arsenamide), less rapidly microfilaricidal, which was injected intravenously in 15 daily doses.

The initial group (or pilot cases) were drawn from the " Fita Fita " or native guards. These were examined for microfilariae three times over a period of 5 months, before treatment. On each occasion a complete sample of 3 blood preparations each of 20 cmm. was counted and the results were summed together in order to obtain the number in 60 cmm. of blood. Finally, the entire population over 5 years of age in two villages were treated as out-patients.

In the first group of 5 " pilot " cases diethylcarbamazine was given, 2 mgm./kgm. 3 times daily for 7 days, and 3 mgm./kgm. daily for an additional 23 days. Within 24 hours over 98 per cent. of the microfilariae had disappeared, while most of the remainder appeared injured; thereafter a few living microfilariae were found on every examination up to 15 days. At the close of treatment microfilariae were found in 2 of the 5 only. In 2 they were still present at the end of 2 years.

The second group of 10 persons received 3 mgm./kgm. t.i.d. for 30 days. Over 80 per cent. of microfilariae disappeared within 6 hours after the first dose. Four still showed microfilariae on the 15th day and 2 at the end of treatment (30 days). Six out of 9 were seen 2 years later and they harboured significant numbers of microfilariae; 2 had reached nearly one-half the pretreatment count.

The third and final pilot group of 11 guards had lower microfilarial counts and received the drug in doses of 7 mgm./kgm. daily for 7 days. No microfilariae were found in any of them at the end of that time. At the end of 2 years 2 had small numbers in the peripheral blood.

A fourth group consisted of a number of villagers treated as out-patients in the village with 3 mgm./kgm. daily for 14 days. Everyone, 5 years old or older, was so treated. Twenty-two persons with microfilaraemia showed a 90 per cent. reduction. Thereafter with each successive examination there was an increase in the number of positives, as well as in the total number of microfilariae. At the end of 2 years microfilariae, though greatly reduced in numbers, were present in all except 3.

The fifth series consisted of another village group treated as out-patients in an island where treatment was combined with an all-out attack on the mosquito vector, and where complete destruction of these insects appeared to have been accomplished. Every person aged 5 years and over was given diethylcarbamazine for 7 days in daily doses of 3 mgm./kgm. Microfilarial counts were made in 36 who received only the one 7-day course of diethylcarbamazine. The sharp immediate reduction in the number of microfilariae was followed by a slow but steady return of these organisms. The most interesting feature in 19 persons in this group was the relative microfilarial reduction after a second course of treatment, a reduction which was not as great as that after the first treatment 3 months earlier.

Sodium thiacetarsamide was administered intravenously in multiple doses, and its use on a community-wide basis was therefore necessarily limited. A comparison with diethylcarbamazine was made.

Fifteen Samoan guards were treated with 1 or 2 per cent. solution in

doses of 1 mgm./kgm. daily for 15 days. In this case there was no immediate reduction in the average number of microfilariae in the 5 who were examined at short intervals during the treatment. There actually appeared to be an *increase* in the peripheral blood during the first few days. Ten persons were negative at the close of treatment, and there was no appreciable return of microfilariae in the post-treatment period. Thus 12 out of 13 examined 1 year later, and 9 out of the 12 2 years later, failed to show microfilariae.

There was an immediate reaction in all those with high microfilaraemia who received diethylcarbamazine, regardless of the scale of treatment. The onset of reactions occurred usually within 6 hours after the first dose, reaching its maximum within 12–24 hours. There ensued invariably an increase in pulse rate and body temperature. Muscular pains, especially in the lumbar region, were prominent. Those with initially less than 100 microfilariae per 60 cmm. of blood remained remarkably free from clinical manifestations. No reactions, however, were recorded in a small group of Samoans, who had clinical manifestations of filariasis without microfilariae.

The group treated with thiacetarsamide showed no immediate reaction regardless of the number of microfilariae present in the circulating blood. Nausea and diarrhoea developed on the fourth or fifth day and were easily controlled by ascorbic acid (50 mgm. q.i.d.).

Later manifestations in the case of diethylcarbamazine consisted of mild lymphangitis and lymphadenitis. In one, however, these manifestations were more severe, culminating in abscess formation (*Staphylococcus aureus*) in the inguinal region. In the thiacetarsamide series with high microfilaraemia a consistent rise of temperature was noted towards the end of treatment. One developed a transient lymphangitis culminating in a staphylococcal abscess.

During treatment the total leucocyte count increased, regardless of the drug employed, the increase being due to eosinophilia. Among those with a microfilaria count exceeding 25 there was a 2- to 4-fold increase in eosinophiles at the end of the first week and up to 6-fold at the end of the second, followed by progressive diminution.

Intradermal tests were employed with 2 antigens from (W), a saline extract of dessicated *Dirofilaria immitis*, and (F), a saline solution of the alcohol-soluble fraction of the above. Intradermal tests were carried out on 23 "Fita Fitas"; 9 who received thiacetarsamide and 10 diethylcarbamazine were tested before treatment, within a week of completion and 1 year later. In addition 4 "Fita Fitas" were included in whom no microfilariae could be demonstrated. All gave positive reactions to all 4 intradermal tests of 0·01 cc. of different dilutions. Little information on the effectiveness of treatment could be obtained by these means.

The rapid disappearance of microfilariae after the use of diethylcarbamazine marks out this compound as being, directly or indirectly, a powerful microfilaricidal agent.

The authors consider that reappearance of microfilariae results from continued or renewed parturition of the same female, or freshly matured worms. The dramatic disappearance of microfilariae after the initial dose, which is not repeated on further treatment, is difficult to explain; it may be related to the rate of absorption of the drug.

The possible effect of diethylcarbamazine upon the adult worms is by no means clear. There was a gradual but incomplete return of microfilariae after treatment. The explanations offered for them are:

(1) The microfilariae result from reinfection after the destruction of all, or part of, the adult worms.

(2) There is reversible interference with parturition, without all or any adult worms being killed.
(3) Failure of full return may be due to incomplete recovery of all adult worms.
(4) The pretreatment microfilarial load takes longer than two years to accumulate.

Philip Manson-Bahr

BHADURI, N. V. & CHOWDHURY, A. B. **Diamino-Diphenyl-Sulphone (DDS) in the Treatment of Filariasis.** *Indian Med. Gaz.* 1952, Nov., v. 87, No. 11, 520–22.

This investigation to determine the therapeutic effect of DDS on filariasis was based upon suggestions of MUIR that 3 of his leprosy patients, who had suffered from typical filarial manifestations, became free from these symptoms when treated with this drug.

In the present study, DDS was given in single daily doses to 72 patients with filariasis. The first series consisted of 14 with demonstrable microfilariae in the blood and exhibiting various signs and symptoms of filarial disease. Five received a dose of 100 mgm. daily and 9 others 50 mgm. daily for 1 to 4 months, but blood examination at the end of 2–12 months did not show any significant change in the microfilaria level. In the second series, 58 patients were included in whom microfilariae were absent, but various filarial manifestations with periodic attacks of lymphangitis and fever were in evidence. DDS, in doses of 100 mgm., was given to 9 and 50 mgm. to 49 for 1 to 4 months [according to the text and tables]. The net result is stated to have been control of fever and lymphangitis for variable unspecified periods subsequent to the use of this drug. No appreciable change was observed in elephantoid conditions. Except in two, tolerance of the drug was good. [In the author's summary, the numbers of patients in the second series are shown as 24 and 34 respectively.] *Philip Manson-Bahr*

BERTRAM, D. S. **Laboratory Studies on Filariasis in the Cotton-Rat.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Mar. v. 47, No. 2, 85–106, 5 figs. [37 refs.] Discussion 107–16 [KERSHAW, W. E.; BUXTON, P. A.; MANSON-BAHR, P.; WOODRUFF, A. W.; CHESTERMAN, C. C.; FAIRLEY, N. H. (President); BERTRAM, D. S. (in reply)].

This paper is concerned with the results obtained in experiments in which cotton-rats were exposed to infection with *Litomosoides carinii* conveyed by vector mites either on a single day or during a prolonged period of superinfection. Much valuable information was obtained which cannot be summarized adequately in a brief review, but certain important conclusions may be mentioned.

In a heavy infection with adult worms the growth, and possibly the reproduction, of female worms is retarded, and the number of microfilariae in the peripheral blood decreases or disappears so that they are found there for a brief period only in the early stages of infection though adult female worms continue to survive in the pleural spaces. Normally, the worms inhabit the pleural cavity but under conditions of overcrowding they may occur also in the peritoneal cavity where their growth and reproduction are not inhibited. Superinfection heavy enough to suppress microfilaraemia is associated with clinical effects which are absent in cotton-rats more heavily infected as a result of a much shorter exposure to infection.

These findings are considered in relation to human filariasis and it is suggested that primary and secondary sites may exist for the development

of the adult worm. The common occurrence, in endemic areas of *W. bancrofti* and *L. loa* infection, of a low incidence of microfilarial infection among children, progressive increase with advancing age and a decline in late life, may be due to superinfection of the primary sites in children, with curtailed microfilarial production until subsequent invasion of the secondary sites in which the worms can mature and reproduce successfully. A high incidence of microfilarial infection with a low density in all age-groups is consistent with reproduction in the primary sites in young persons, followed later, perhaps, by additional reproduction in secondary sites. A slower rate of superinfection may be responsible for the recorded increase of blood infections in mosquito-borne filariasis after substantial control of the vector.

In the discussion which followed, KERSHAW corroborated Bertram's findings but was unwilling to accept an analogy between human and rodent filariasis; parasitic combinations behaved as separate entities and were similar only in general principles. Incidence curves of *W. bancrofti*, *W. malayi*, *O. volvulus*, *L. loa* and *D. perstans* in 10-year age-groups were very different, and similarly, differences in intensity were marked in the case of *L. loa* and *D. perstans*. The mechanism of suppression of *L. loa* acted on the incidence with little effect on intensity, and in *D. perstans* on intensity and not incidence. The absence of microfilaraemia in a proportion of the young, though harbouring adult worms, may be due to failure of males and females to meet in the tissues, to the existence of a visceral reservoir of microfilariae, or to a suppressive mechanism resulting from repeated infections and enabling the host either to destroy microfilariae, inhibit reproduction or suppress the development of further infective forms. MANSON-BAHR did not think that such heavy parasite concentrations occur in man as in the cotton-rat.

In replying, Bertram advocated caution in interpreting human filarial infection in terms of cotton-rat filariasis but thought that the latter might offer general principles which were applicable. In human filariasis he was impressed by the general similarity of the incidence curves, differences in which might be influenced as much by the degree of superinfection as by host-parasite balance of a specific nature. He thought it unlikely that in *W. bancrofti* filariasis the whole lymphatic system was severely infected; certain glands are possibly primary sites in which superinfection might affect reproduction.

This important paper should be read by those interested in the epidemiological characteristics of human filariasis. *T. H. Davey*

KARTMAN, L. **Factors influencing Infection of the Mosquito with** *Dirofilaria immitis* **(Leidy, 1856).** *Exper. Parasit.* New York. 1953, Jan., v. 2, No. 1, 27–78, 10 figs. [Numerous refs.]

The susceptibility of mosquitoes to infection with *Dirofilaria immitis* of dogs was compared by feeding on a bitch with a count of 16,000 to 18,500 microfilariae per cc. of blood, batches of *Anopheles quadrimaculatus*, *A. freeborni*, *Culex fatigans*, *C. pipiens*, reciprocal cross of these two species of *Culex*, *Aëdes aegypti*, *Aëdes albopictus* and hybrids from *Aëdes aegypti* ♀ × *Aëdes albopictus* ♂ crossings. In addition, strains of *Aëdes aegypti* from the U.S.A. (lab. strain), Hawaii, South Africa, Sudan and Fiji were compared for susceptibility. Occasionally another dog was also used as the infecting host.

The microfilariae of this parasite migrate from the midgut after their ingestion to the Malpighian tubes where, with the mosquitoes kept at 27°C.

in a saturated atmosphere, they become infective forms in 10 or more days. They then break out of the tubes and rapidly migrate through the haemocoele to the labium.

In an initial experiment comparison was made of *Aëdes aegypti*, *C. fatigans* and *A. quadrimaculatus* by observing for 20 days in a daily sample of about 10 mosquitoes from batches fed on the infected dog, the number and proportions of the parasite at different stages of development. Note was also taken of the final length of the infective forms and the encapsulation (" chitinization ") of worms. With this amount of information it was possible to consider the efficiency of the different mosquito species by some more sensitive method than merely the percentage of them finally developing infective forms. In principle, the number of developing forms, and also the number of infective forms, seen in all the mosquitoes dissected over 20 days for each species are expressed as a ratio of the total number of microfilariae ingested by them. To obtain an estimate of the total microfilariae ingested, counts of the microfilarial intake of 35 specimens immediately after feeding were averaged. This average multiplied by the number of mosquitoes dissected in 20 days (approximately 10×20 days $=$ 200) is taken as the estimate of the total microfilariae ingested. Thus, the total microfilariae ingested were as follows: 6,183 microfilariae by 229 *Aëdes aegypti*; 7,875 by 210 *C. fatigans*; and 6,322 by 210 *A. quadrimaculatus*. The numbers of developing forms seen in these specimens were 175, 153 and 3,798 for *Aëdes aegypti*, *C. fatigans* and *A. quadrimaculatus* respectively. The numbers of infective larvae found were, in the same sequence of the species, 29, 81, 1,347. The ratios of developing forms to total microfilariae ingested were therefore $\frac{175}{6,183} = 0{\cdot}03$ for *Aëdes aegypti*, $\frac{153}{7,875} = 0{\cdot}02$ for *C. fatigans*, and $\frac{3,793}{6,322} = 0{\cdot}6$ for *A. quadrimaculatus*. This expression is taken as a measure of *host efficiency*. The other ratio for each species, namely the number of infective forms to the total microfilariae ingested, is presented as a measure of the *infective potential* of the species and, from these data, is 0·004, 0·01 and 0·2 for *Aëdes aegypti*, *C. fatigans* and *A. quadrimaculatus* respectively. The highest index of efficiency as a vector therefore is obtained with *A. quadrimaculatus*; *C. fatigans* is less competent and *Aëdes aegypti* the least susceptible. These measures of susceptibility and efficiency are also computed in the several other tests conducted.

The results in the other experiments were, briefly, as follows: *Anopheles freeborni* was slightly less efficient than *A. quadrimaculatus* and *Aëdes albopictus* was, unlike *Aëdes aegypti*, just as efficient as *A. quadrimaculatus*. *C. pipiens* was very refractory (*host efficiency* 0·008 and *infective potential* 0·004) differing markedly from *C. fatigans*. Both reciprocal crosses of the two *Culex* species showed an efficiency and susceptibility resembling *C. fatigans*. The *aegypti* ♀ × *albopictus* ♂ cross exhibited not only morphological features solely of *aegypti* but also the refractory characteristics to infection of *Aëdes aegypti* (the other reciprocal cross gave no progeny and could not be tested).

Strains of *Aëdes aegypti* from South Africa and the Sudan resembled the U.S.A. laboratory strain in their infectibility, but the Hawaian strain was more and the Fijian strain less susceptible and efficient than the others. The susceptibility of a strain of *Aëdes aegypti* was both increased and decreased by selection, but this did not take place with one of the hybrid strains of the *Culex* species.

Few normal microfilariae occurred in the midgut of *C. fatigans* 24 hours after ingestion, or after 48 hours in *A. quadrimaculatus*. Living microfilariae, not always normal, persisted for 96 hours in the midgut of the *Aëdes* species. In the latter, a blood clot forms rapidly and appears to obstruct the passage of the microfilariae to the Malpighian tubes. On the other hand, an anticoagulant in the saliva of *A. quadrimaculatus* appears to delay clot formation and promotes easier and earlier migration of many of the microfilariae to the Malpighian tubes.

Other observations are reported. There is a greater variability between the microfilariae intakes of *Aëdes aegypti* fed on a dog than in individuals fed through a membrane on a suspension of microfilariae. In simultaneous infection of *Aëdes aegypti* with *Folcyella brachyoptera* of the frog (which develops elsewhere than the Malpighian tubes) and *D. immitis* (provided together in suspension under a membrane) there was no interference of one parasite with the development of the other. The greatest intake of microfilariae from a dog by mosquitoes (*Aëdes aegypti* were used in the experiment) occurred between 6 p.m. and 10 p.m.

There is a lengthy and comprehensive discussion of the results. It is concluded that despite evidence of a genetic influence on susceptibility it cannot be shown as yet that susceptibility is controlled by a simple Mendelian recessive. Rapid migration from the midgut to the Malpighian tubes contributes substantially to the success of a species as a vector and anticoagulant action of salivary secretions appears to be important in this respect. It is observed that if the biting cycle of a mosquito with a high host efficiency and infective potential coincides with a peak period in a periodic filaria, excessive infection of the mosquitoes with developing parasites may kill many of the mosquitoes. On the other hand, the same species biting when the microfilaraemia in the host is low could support successful development of moderate numbers of worms and still survive in good numbers to transmit them.

[The original should be consulted for the great deal of data embodied in the text, 11 tables, and 10 figures. The discussion is stimulating and commendable for its collation and treatment of the literature on the susceptibility of mosquitoes to filarial and other parasites which they transmit.] *D. S. Bertram*

PIERS, F. **Onchocerciasis with Cutaneous Lesions in a European.** *East African Med. J.* 1953, Mar., v. 30, No. 3, 111–13.

The author describes the clinical state, investigation, and treatment of a European married woman, aged 19 years when he first saw her in 1949, who he believes was infected with *Onchocerca volvulus* by *Simulium* flies when she lived in the Kaimosi area of Nyanza Province, Kenya, between 1945 and 1947. She began to suffer from pruritus and inflammation of the eyes in 1948. Apart from a transient improvement during a pregnancy in 1949 the patient became worse until, in June, 1952, when fuller investigations were possible in Nairobi, she was underweight and sleepless and suffered from intense pruritus and defective vision. The skin was pale, dry, thickened and excoriated over most of the body. There were two hard subcutaneous nodules, one over the left hip and one over the back of the neck. Ophthalmological examination showed corneal opacities, pannus and early iridocyclitis. Visual acuity was R 6/60 and L 6/12. No microfilariae were seen in the eyes, and skin snips were also negative. The leucocyte differential count showed 40 per cent. eosinophiles. These findings suggested the diagnosis of onchocerciasis, and oral administration of

diethylcarbamazine (' Hetrazan ' or ' Banocide ') was started at a dose of 300 mgm. per day, which in one weighing 59 kgm. represents a little over 5 mgm. per kgm. This dose provoked a marked reaction, controlled by Dibistin (Ciba) [an antihistamine] tablets, and by reducing the dose of hetrazan to 100 mgm. daily (1·7 mgm. per kgm.). This reduced dose was continued for 5 days, and then for 5 days was gradually increased to the initial level, at which it was continued until 6 gm. had been taken. Marked clinical improvement occurred. Since the patient was leaving Nairobi further treatment was ordered at 100 mgm. daily for one month, and at 150 mgm. daily for a second month. Similar " chronic intermittent " dosage is intended to control recurrence of pruritus. The author regards diethylcarbamazine as the drug of choice in onchocerciasis even though its action may be only suppressive. *S. Bell*

Dowsett, Lynette M. & Brown, A. E. **Treatment of Oxyuriasis with Diphenan.** *Lancet.* 1953, May 30, 1070–72. [14 refs.]

The authors mention literature in which it is claimed that diphenan (Butolan) will rid children of oxyurids and that it is not toxic, is tasteless and kills the worms. To study its effect they planned a continuous attendance at school of the children examined for 30 days, during which each child was examined by 9 successive daily diagnostic swabs, followed by treatment of the infected children and 9 swabs after treatment. Only the children thus examined are included in this report. They were examined by the " Cellophane " tape technique. The doses given ranged from 0·5 to 1 gm. 3 times a day for 10 days. They caused no untoward symptoms.

The results were that 35 (20 per cent.) of the 174 children were " cured," 77 (44 per cent.) gave fewer positive swabs after treatment than before it, 31 (18 per cent.) were worse after treatment, and 31 (18 per cent.) gave the same number of positive swabs after treatment as before it. The shift towards improvement after treatment was slight and could be explained by a tendency to extra cleanliness during the survey. The results are, the authors say, all the more disappointing because the doses given were considerably higher than those which are recommended. They suggest that the incidence of enterobiasis among school children in their series is about 80 per cent. *G. Lapage*

Bumbalo, T. S., Gustina, F. J. & Oleksiak, Rose E. **The Treatment of Enterobiasis with Thymyl-N-Isoamylcarbamate (Egressin).** *J. Parasitology.* 1953, Apr., v. 39, No. 2, 166–8.

The authors briefly summarize some of the earlier literature on the treatment of enterobiasis and report the results of their treatment of 31 children and 3 adults with thymyl-N-isoamylcarbamate (egressin). The results obtained by Zima *et al.* [this *Bulletin*, 1951, v. 48, 186] and Eichholtz and Hotovy [*ibid.*, 187] are not mentioned. The authors were, however, able to confirm the conclusion of Sauer and Weissflug [*ibid.*, 188] that egressin is a non-toxic and safe chemotherapeutic agent. They state that Dr. Beyer [no ref.] gave varying excessive doses of egressin to 9 dogs by the mouth and found no appreciable changes in the urine, blood, rectal temperature or weight.

The present authors treated 31 children and 3 adults. They gave the smaller children tablets containing 0·25 gm. of egressin and the older children and the adults tablets containing 0·5 gm. The total daily dose was about 3·2 gm. per sq. metre of body surface and the average dose 0·87 gm.

per lb. body weight. Equal doses were given 3 times a day after meals for 5 days. Examinations by the Scotch tape technique were made 1 to 4 days after treatment, 3 to 8 swabs being taken.

Results showed that 18 of the 34 patients (53 per cent.) "were cured." There were no untoward effects, except that 1 child and 1 adult passed loose stools. Sauer and Weissflug (*loc. cit.*) also found diarrhoea in some of the adults treated by them. All the patients were told to avoid fatty foods, because an oily vehicle increases absorption (in animals). Alcohol was also forbidden as egressin interferes with the oxidation of alcohol, so that nausea and gastric troubles may result.

The authors conclude that, although the number of patients treated is small, egressin falls far short of being an ideal drug for the treatment of enterobiasis. The percentage of cures obtained is less than that obtained with phenothiazine, or gentian violet, and the results are comparable with those obtained with diphenan. The authors suggest trials of larger doses of egressin, perhaps given for a longer time. *G. Lapage*

BOURNS, T. K. R. **Trichinosis in the Vancouver Area. Examination of 400 Human Diaphragms.** *Canadian J. Pub. Health.* 1953, Apr., v. 44, No. 4, 134–6.

"The 4 per cent. incidence demonstrated by this survey points to the desirability of a control program involving public education with particular reference to the cooking of pork, and secondly a program of close inspection of hog feeding and rodent control at the piggeries near Vancouver."

OLIVER-GONZÁLEZ, J. *In Vivo* **Inhibition of Blood Agglutinins by Polysaccharides from Animal Parasites.** *Proc. Soc. Exper. Biol. & Med.* 1953, Apr., v. 82, No. 4, 559–61.

"1. Monkeys and rabbits were injected intravenously with various amounts of polysaccharides (dissolved in 0·85% saline) prepared from the muscle stage of *Trichinella spiralis* and from adult *Ascaris lumbricoides* from pig. 2. The titer of the a_2 isoagglutinins detected at 37°C. in the serums of the animals was reduced to negative for a period of 24 hours, and remained lower than the titer before inoculation for a period of 96 hours. 3. The titer of the a_1 was also reduced, but not as much as the a_2 agglutinins. 4. The titer of the agglutinins acting at 6°C. against A_1, A_2 human, sheep, and the animal's own erythrocytes was also reduced after inoculation of the polysaccharide. 5. The possibility of injecting these polysaccharides to inhibit autoagglutination of erythrocytes as seen in certain pathological conditions is mentioned."

CHATTERJEE, K. D. **Human Parasites and Parasitic Diseases for Students, Laboratory Workers, Practitioners of Medicine and Public Health.**

This book is reviewed on p. 868.

DEFICIENCY DISEASES

NELSON, J. W. **Pachyderma. II. Enunciation of the Hypothesis of a Fat Deficiency Syndrome in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, May, v. 47, No. 3, 224–34, 8 figs. [13 refs.]

A condition of thickening and roughening of the skin common among children in Northern Rhodesia is described and illustrated. Pachyderma is

suggested as a suitable name [this *Bulletin*, 1953, v. 50, 146]. The condition is associated with consumption of a diet low in calories. It is worse in the dry season and improves during the rains. All the children had diets low in fat, estimated intakes varying from 2 up to 30 gm. per day, but there was no correlation between the total fat intake and the incidence of pachyderma. Some of the children had diets very low in vitamin A activity, but again this was not closely associated with the skin condition.

Pachyderma in human beings resembles in appearance unsaturated fatty acid deficiency in rats and the suggestion is made that it is due to dietary deficiency of these acids. [Most persons in the tropics will be familiar with this condition and pachyderma seems to be an admirable descriptive title. As the author points out, it is associated so widely with a poor intake of many essential nutrients and with environmental stresses, that it is difficult to determine the precise aetiology.] *R. Passmore*

STANIER, M. W. **Serum Proteins in Africans.** [Correspondence.] *Nature.* 1953, May 16, v. 171, 880–81, 1 graph.

Previous work [HOLMES, STANIER, SEMAMBO and JONES, this *Bulletin*, 1952, v. 49, 535] has shown by chemical methods that there is a relation between mean red-cell count and serum-protein levels. Those Africans with the highest red-cell counts have a higher mean albumin level and a lower globulin level than those with lower red-cell counts. This work has now been repeated and, in the main, confirmed by means of a micro-electrophoresis (Antweiler) technique for estimating the serum-protein fractions.

Serum-protein levels of normal Europeans living in Africa were normal; the means for a group of 7 African medical students were similar to European values except for the γ-globulin level which was more than twice the European mean.

Serum-protein measurements and red-cell counts were made on blood samples from 55 surgical patients. There was a progressive increase of mean serum albumin from the lowest blood-count group. In contrast with earlier findings the mean α- and β-globulin levels varied little, the variation of globulin occurred almost entirely in the γ-fraction. The discrepancy with previous work, where β-globulin was calculated by difference, is due to the fact that in African sera some of the substances having electrophoretic mobility are not precipitated by ammonium sulphate, as used in the earlier work. It now appears that the variation in the different blood-count groups occurs mainly in that part of the γ-globulin not precipitated by saline ammonium sulphate. *J. H. Birkinshaw*

LINHARD, J., BUSSON, F., GIRAUD, P. & GUYONNET, C. Étude de la protéinémie sérique totale d'Africains à Dakar. (Protéinémie relative.) [**Study of Total Serum Protein in Africans in Dakar**] *Méd. Trop.* Marseilles. 1953, Jan.-Feb., v. 13, No. 1, 21–9, 3 figs. [37 refs.]

Determinations of total serum protein were made on 171 European men and 1,513 African men at Dakar, by the refractometric method, with frequent checks by a gravimetric method involving precipitation of protein with 10 volumes of 95 per cent. alcohol. Blood from the umbilical cord of 89 new-born Africans was also examined. The mean value for the Europeans was 77·6, for African men 81·72 and for African new-born babies 64·87 gm. per litre. [Normal average, 63 to 82 gm./litre.] Both European and African values for serum protein varied according to season, and showed

striking parallelism. There was a marked fall in values from mid-May to mid-July, when the values began to rise, reaching their earlier values by October. *J. H. Birkinshaw*

YOSHIDA, H. **Electrophoretic Analysis of Serum Protein of Children with or without Nutritional Dystrophy. Studies on the Nutrition of Children in the Hirosaki Area. (14th Report.)** *Tohoku J. Exper. Med.* 1953, Feb. 25, v. 57, Nos. 2/3, 205–10.

"Abnormality in the electrophoretic pattern, characterized by a decrease in albumin accompanied by an increase in alpha and gamma globulin, was found in sick children with clear symptoms of nutritional dystrophy."

YOSHIDA, H. & SATO, Y. **Electrophoresis of Sera, Liver Biopsy Finding and Sato's Bromsulfalein Test in Children with Negative Response to the Ordinary Bromsulfalein Test. Studies on the Nutrition of Children in the Hirosaki Area. (15th Report.)** *Tohoku J. Exper. Med.* 1953, Feb. 25, v. 57, Nos. 2/3, 211–20, 1 fig.

"Among the sick children who showed negative response to the ordinary bromsulfalein test, the 'abnormal' electrophoretic pattern characterized by an increase in gamma globulin accompanied by a decrease in albumin was found in the cases which were positive to Sato's bromsulfalein test and, in addition, showed histopathological changes of cytoplasm with fibrosis in the biopsied livers."

WALTERS, J. H. **Hyperpiesis in Cardiovascular Beri-Beri.** *Quart. J. Med.* (n.s.) 1953, Apr., v. 22, No. 86, 195–214, 18 figs. [15 refs.]

"1. Examples of severe cardiovascular beri-beri occurring among pearl divers in the Persian Gulf are described.

"2. Arterial hypertension, which increased on treatment with aneurin, was the outstanding clinical feature.

"3. Permanent myocardial damage was observed in at least one patient who survived.

"4. Possible mechanisms of the hypertension are discussed. The suggestions made are tentative, and further investigation is required before firm conclusions can be drawn."

SACHS, S. B. **The Social Aetiology of Malignant Malnutrition.** *South African Med. J.* 1953, May 16, v. 27, No. 20, 430–32.

In 44 out of 80 Bantu children with malignant malnutrition, the primary cause of the dietary disorder was parental neglect, the child not being a member of a normally constituted family. The essential cause of the neglect was,

Illness of mother	8
Death of mother	3
Desertion of father, mother working	21
Illegitimacy	8
Insufficient income	4
Total	44

The supply of food and medical care to such children does not remedy the root of the evil, which "will continue unless the life in urban areas is re-orientated to the old values of family responsibility and the unity of family life." *R. Passmore*

JELLIFFE, D. B. **Clinical Notes on Kwashiorkor in Western Nigeria.** *J. Trop. Med. & Hyg.* 1953, May, v. 56, No. 5, 104–9, 8 figs. & 1 diagram. [16 refs.]

The notes and excellent photographs provide a good account of 44 Yoruba children treated in Ibadan for kwashiorkor in 1950. This is almost the first record of the disease from Nigeria and differs in no important respect from records of cases in East Africa and elsewhere. [Those with experience of the disease and its literature will learn little from this paper: for the uninitiated it can be strongly recommended.] *R. Passmore*

SPRUE

JIMÉNEZ DÍAZ, C., ROMEO, J. M. & MARINA, C. **Diarrhoea and Steatorrhoea. (Contribution to the Study of Sprue and Repercussion Enteritis.)** *Bull. Inst. Med. Res.* Madrid. 1952, Apr.-June, v. 5, No. 2, 93–112, 4 figs. [21 refs.]

The authors of this paper report observations on the caloric and fat content of the stools of 283 patients suffering from a variety of diseases. Fat balance tests were not carried out. It is reported that the caloric value of a 24-hour specimen of the faeces in patients with sprue is usually over 300 per day, while in simple enteritis and in a variety of other diseases it is less than this. In 37 cases of sprue and of sprue-like enteritis, it was found that the daily amount of fat lost in the faeces depended upon the weight of the faeces passed, rather than on the percentage of fat in any given specimen, *i.e.*, the total amount of fat in those passing large quantities of stool daily was greater than that in those passing only small amounts. Secondly, it is reported that caloric losses in the faeces, like those of fat, are proportional to their weight. Thirdly, when doses of 100 gm. olive oil are given to patients with steatorrhoea, considerable quantities of the supplement are absorbed. From this it is deduced that within limits elimination of fat does not depend on the diet.

These observations, it is concluded, are accounted for more readily by fat being excreted by the intestinal mucosa than by a failure to absorb fat. It is suggested that in simple enteritis the intestinal wall secretes two fluids, one containing albumin and another containing fat. The latter is secreted when steatorrhoea is present. It is further suggested that the fatty secretion may be chyle, though it is admitted that "it is difficult to explain the presence of chyle in the stools".

[This is an involved paper containing numerous hypotheses which are inadequately backed up by observation. Confusion is increased by the introduction of many new and unorthodox terms, by the fact that the diagrams are not numbered and the figures on the abscissae and ordinates of the graphs are mostly illegible. Excessive excretion of fat may play a part in the causation of sprue but fat balance studies have proved beyond reasonable doubt that a defect in absorption is present. It has also been

shown that when the amount of fat in the diet is varied in patients with sprue the amount in the faeces also varies, the percentage absorbed remaining roughly constant. This could be explained on grounds other than secretion of fat by the intestinal mucosa, and is not incompatible with a defect in an enzyme system normally concerned in fat absorption.]

A. W. Woodruff

SALVESEN, H. A. **The Blood Pressure in Idiopathic and Symptomatic Steatorrhoea.** *Acta Med. Scandinavica.* 1953, Jan. 30, v. 144, No. 4, 303–12, 2 figs. [12 refs.]

The paper records the blood pressures of 84 patients (51 men, 33 women of all age-groups) suffering from non-pancreatic steatorrhoea. There was some hypotension in all age-groups, especially in the older patients at the ages in which hypertension is common. Hypotension was present in non-anaemic cases, and in those with normal water/electrolyte equilibrium.

The author concludes that his observations "indicate that a condition of non-pancreatic steatorrhoea prevents the development of hypertension and in most patients even produces a marked hypotension." He suggests that in steatorrhoea there may be defective absorption of some lipoid substance necessary for the maintenance of normal blood pressure.

[The author's records are interesting but there is little substance in his arguments. He does not clearly state what forms of steatorrhoea he is concerned with. In the title of his paper he refers to "idiopathic and symptomatic" steatorrhoea; in the text he talks about "sprue."]

B. G. Maegraith

COLCHER, H., DRACHMAN, S. R. & ADLERSBERG, D. **Management of Intractable Sprue with Cortisone and Adrenocorticotropin (ACTH).** *Ann. Intern. Med.* 1953, Mar., v. 38, No. 3, 554–67, 2 figs.

The 8 patients studied were, from the clinical aspect, cases of primary sprue (in other words, non-tropical or idiopathic steatorrhoea). These revealed, at one time or another, most of the features of this syndrome; namely diarrhoea, steatorrhoea, loss of weight, anaemia, polyavitaminosis, hypocalcaemia, hypoproteinaemia, tetany and osteoporosis. This series of patients consisted of 4 men and 4 women of ages ranging from 28 to 72 years. One, a native of Porto Rico, may have contracted tropical sprue, but this appears to be doubtful. All had stomatitis, abdominal distension and glossitis. Three patients exhibited tetany; 2 purpura and 3 oedema of the lower extremities. All patients were chronically malnourished, with weight loss ranging from 19 to 73 pounds. Duration of symptoms varied from 1 to 20 years.

Seven of the patients showed varying resistance to liver and other generally accepted treatment. The most consistent therapeutic response was haematological. In some, improvement in anaemia was noted, with disappearance of the megaloblastic arrest and return of the prothrombin time to normal. The possible rôle of the adrenal cortex in intestinal absorption suggested the use of cortisone and ACTH in non-tropical sprue. Because of the necessity for frequent intramuscular injections, treatment with ACTH was limited to hospitalized patients. After discharge from hospital the therapy was continued exclusively with cortisone. The initial dose of ACTH was usually 100 mgm. daily, given intramuscularly in 4 equally divided doses. The initial dose of cortisone was also of the same amount, divided into two doses, intramuscularly in 5 courses and orally in

8. These liberal doses were maintained for 1 to 2 weeks, by which time striking improvement had usually been observed. During the treatment period previous anti-anaemic therapy was continued. Those patients with hypocalcaemia and marked osteoporosis were given calcium in the form of calcium gluconate. Repeated intramuscular injections resulted occasionally in abscess at the site. Overt tetany was observed on 4 occasions, probably owing to hypochloraemic alkalosis. Mercurial diuretics were occasionally administered to oedematous patients.

Twenty-one courses of hormone therapy (13 of cortisone and 8 of ACTH) were observed in 8 patients. The duration of cortisone varied from 5 to 155 days: that of ACTH from 5 to 53 days. Striking improvement was registered 1 to 3 days after institution of therapy in 5 patients. In one no remission took place but in 2 others improvement was gradual and limited. A sense of well-being, increase of activity and alertness resulted; with increase of weight. This latter was more marked with cortisone than with ACTH. Diarrhoea, with one exception, ceased in 1 or 2 days; steatorrhoea, however, persisted throughout the courses of treatment, but was, on the whole, diminished. No changes in the blood picture were noted. The flat oral glucose tolerance tests were essentially unaltered. In those with hypoalbuminaemia there was a decided increase in the serum albumin fraction.

The degree of improvement varied with each patient. In 5 it was most striking with cessation of diarrhoea, substantial weight increase and ability to tolerate normal diet. In one case recounted in detail in a Canadian male of 35, the improvement was most impressive. In a period of 77 days of continuous cortisone treatment there was a gain of weight of over 30 lb. and he was able to resume normal activity. Clinical improvement was accompanied by an elevation of serum albumin, a transient fall of faecal fat and improvement in the X-ray findings in the small intestine. Continuous administration of maintenance therapy proved necessary.

The net results of these observations indicate that the use of cortisone and ACTH does not constitute a cure for non-tropical sprue, but these compounds do produce a definite, and often dramatic, clinical improvement in patients resistant to the accepted forms of therapy.

Philip Manson-Bahr

HAEMATOLOGY

BROWN, W. O. **Effect of Dietary Penicillin on Blood Composition and Oestrogen-Induced Oviduct Growth in the Folic-Acid Deficient Chick.** [Correspondence.] *Nature.* 1953, May 9, v. 171, 845–6.

Eighty Light Sussex female chicks were reared for 2 weeks on a commercial chick mash, and were then placed on a folic-acid-deficient diet with the addition of vitamin B_{12} at a level of 5 μ gm. per 100 gm. One group of these chicks was then given procaine penicillin at a level of 20 mgm. per kgm. diet, but the other was maintained on the previous regime.

A mark of folic-acid depletion in chicks is the fall in the level of haemoglobin and in the weight of the oviducts. It was noted that, when the deficient chicks were treated either with folic acid or with penicillin, the weight of the oviducts and the haemoglobin level were considerably above those seen in the controls.

The particular interest of this note is its bearing on the work of Foy and his collaborators in Kenya. Just as they raised the haemoglobin level of patients suffering from megaloblastic anaemia by penicillin treatment [this *Bulletin*, 1952, v. 49, 892, 1069], so, in the present work on chicks, the haemoglobin level was higher when penicillin was given with a folic-acid-deficient diet. *H. Lehmann*

Portier, A., Massonnat, J. & Zevaco, P. Enquéte sur la thalassémie en Afrique du Nord. [**Investigation of Thalassaemia in North Africa**] *Algérie Méd.* 1952, Jan., v. 56, No. 1, 23–9.

In this survey, 1,166 Mohammedan—*i.e.*, indigenous—inhabitants of Algeria and Tunisia were examined. Of these 304 had either an enlarged spleen or were anaemic with or without spleen enlargement: 134 of these showed evidence of thalassaemia. There was more thalassaemia among children than among adults; of 170 children selected because of anaemia or spleen enlargement 99 (58 per cent.), and of 134 similarly segregated adults 35 (26 per cent.), showed the abnormality. [This work reports from Africa frequencies of the thalassaemia abnormality which are not surpassed anywhere in Greece or Italy.] *H. Lehmann*

Bousser, J., Antonelli, J., Audry, M. & Laplanche, C. A propos d'un cas de thalassémie mineure chez un Nord-Africain. [**A Case of Thalassaemia Minor in a North African**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1953, Nos. 15/16, 456–62. [46 refs.]

Batistetti, E. Anemia de Cooley. [**Cooley's Anaemia**] *Med. Cirurg. Farmacia.* 1952, Oct., No. 198, 480–88, 6 figs.

A general account and report of a case in Brazil.

Englert, E., Jr. & Warshaw, L.J. **Familial Mediterranean (Cooley's) Anemia complicated by Chronic Hepatitis. Results of Treatment with ACTH.** *Amer. J. Med.* 1952, Oct., v. 13, No. 4, 507–16, 3 figs. [36 refs.]

"A case of Mediterranean anemia in an adult aggravated by the development of chronic hepatitis and cirrhosis is reported. The effects of liver disease on the bone marrow and of anemia on liver disease are discussed. A short course of treatment with ACTH resulted in a rise in the blood count and apparent clinical improvement which were not accompanied by any improvement in the liver function tests, the hemolytic index, the blood smear or the hepatosplenomegaly. These benefits, moreover, were only temporary and probably represented a non-specific response."

Neel, J. V., Itano, H. A. & Lawrence, J. S. **Two Cases of Sickle Cell Disease presumably due to the Combination of the Genes for Thalassemia and Sickle Cell Hemoglobin.** *Blood.* 1953, May, v. 8, No. 5, 434–43, 1 fig. [27 refs.]

"A family of Greek derivation is described in which 2 out of 6 children examined exhibited a sickle cell type of anemia. The father of these children was found to have thalassemia minor and the mother the sickle cell trait. It is presumed that the anemia in the two children was due to simultaneous heterozygosity for the sickling and thalassemia genes. Biochemical studies with reference to the occurrence and amounts of

normal, sickle cell, and fetal hemoglobin were carried out on the parents and the 6 children. The theoretic interpretation of the biochemical findings is discussed."

LIÈVRE, J. A. & RÉNIER, J. C. Un cas d'anémie à hématies falciformes, avec lésions osseuses. [**A Case of Sickle Cell Anaemia With Bony Lesions**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1953, Nos. 13/14, 361–8, 3 figs. [14 refs.]
A case in an African from Algeria.

GOODMAN, M. & CAMPBELL, D. H. **Differences in Antigenic Specificity of Human Normal Adult, Fetal, and Sickle Cell Anemia Hemoglobin.** *Blood.* 1953, May, v. 8, No. 5, 422–33, 1 fig. [13 refs.]

"1. Small differences in the antigenic structures of human normal adult hemoglobin and sickle cell anemia hemoglobin were found to exist. A difference in the serologic behavior of these two hemoglobins attributable to a factor other than that of antigenic specificity was also demonstrated. This factor is thought to pertain to differences in the physicochemical properties of the 2 hemoglobins.

"2. Rabbit antiserums failed to show a difference in antigenic specificity, but with chicken antiserums a difference was clearly demonstrated when the in vitro reactions were performed under conditions which produced maximal precipitation. Results suggest that these 2 hemoglobins have a predominance of common antigenic determinants but a small number that are unique for each of the types.

"3. Relatively large differences in specificity were found to exist between fetal hemoglobin and adult hemoglobin which suggests that only a few antigenic groups are shared in common by the 2 types.

"4. The second, minor hemoglobin in patients with sickle cell anemia was shown to have an antigenic specificity that was either identical with or very similar to that of fetal hemoglobin."

GREEN, T. W., CONLEY, C. L. & BERTHONG, M. **The Liver in Sickle Cell Anemia.** *Bull. Johns Hopkins Hosp.* 1953, Feb., v. 92, No. 2, 99–127, 6 charts and 10 figs. [16 refs.]

The authors examined 45 cases of sickle-cell anaemia and obtained information concerning 5 from hospital records. Most patients were seen on repeated occasions both during crises and in remissions. Thirty-nine patients had "typical sickle-cell anemia, with persistent anemia, unremitting jaundice and recurrent episodes of pain in the abdomen and extremities." Eleven were classified as "atypical sickle cell disease."

The liver was palpable in 33 patients at some time during observation. The enlargement was moderate in most; in a few the liver edge was palpated below the umbilicus. Most marked enlargement was found in patients in the third and fourth decade; enlargement was uncommon in the second and third decades. The liver was often palpable only during episodes of crisis. Forty-six patients had some cardiac enlargement but congestive failure was rare. There was no correlation between the degree of liver enlargement and the severity of the anaemia.

Jaundice was present in all anaemic patients. Serum bilirubin often rose during crises. In patients with marked evidence of hepatic dysfunction bilirubin was present in the urine.

Bromsulphthalein retention was exhibited in some cases. Retention was not increased during crises.

The serum alkaline phosphatase, prothrombin time, serum cholesterol and proteins, and cephalin flocculation and thymol turbidity tests were examined in some patients. In general the most pronounced abnormalities in these tests occurred in older patients and were usually associated with other signs of hepatic insufficiency.

The authors describe the findings of 21 autopsies conducted over the years 1920–1951 on those with clinical evidence of sickle-cell anaemia; 7 of these autopsies were carried out on patients included in the present clinical study.

The most prominent finding was intense congestion of the sinusoids by sickled red cells and phagocytosis of erythrocytes by Kupffer cells. The latter were often enormously distended with erythrocytes. No vascular thrombi were seen. Many patients showed diffuse atrophy of the liver cells, most notable in the central zones of the lobule. Four had marked nodular cirrhosis; in some areas there was central scarring, in others evidence of "healed massive necrosis." Five had "large fresh necroses" with centrilobular distribution "characteristic of generalized impairment of effective hepatic flow."

The authors ascribe the focal necroses to local ischaemia, probably resulting from the obstructive effect of the engorged Kupffer cells and of the effect of intravascular sickling on the viscosity of the blood. They admit the possibility that "local shunting of hepatic sinusoidal blood flow as the result of some vascular spasm may theoretically be a factor" in the development of the focal necroses. *B. G. Maegraith*

Harrison, F. G. & Harrison, F. G., Jr. **Hematuria with Sickle Cell Disease.** *J. Urology.* 1952, Dec., v. 68, No. 6, 943–9, 2 figs. [11 refs.]

"Nine patients with unilateral renal hematuria and associated sickle cell disease are reported.

"The pathology reports of four kidney specimens from these patients lead us to believe sicklemia to be the cause of hematuria.

"The shock or preshock theory of Kimmelstiel explains the process of sickling of the erythrocytes with resultant peripheral vascular spasm leading to ischemic necrosis of tissue by 'packing' of the capillaries with sickled cells causing damage to the vessel walls and ultimately infarctions.

"Sicklemia associated with some inherent defect found only in one kidney is proposed as an explanation of unilateral renal hematuria.

"With modern advances, it is believed that surgery is not contraindicated in sicklemics; therefore it is our opinion that nephrectomy is indicated for uncontrollable unilateral renal hematuria associated with sickle cell disease."

VENOMS AND ANTIVENENES

Porges, N. **Snake Venoms, their Biochemistry and Mode of Action.** *Science.* 1953, Jan. 16, v. 117, 47–51,

This is a very clear summary of modern knowledge of snake venoms. A brief account is given of various fractions of both main types of venom. Coagulant venoms contain either proteolytic enzymes capable of coagulating pure fibrinogen uninhibited by antithrombin, or enzymes able to convert

prothrombin to thrombin. They may also cause some direct damage to blood vessels. An important group of toxic substances in haemolytic non-coagulative venoms are the phosphatidases, which cause haemolysis by the liberation of lysolecithin from lecithin. Lysolecithin itself has effects on the heart similar to those produced by venom, and appears to be concerned in the liberation of histamine by the tissues, which in turn is associated with increased vascular permeability.

Neurotoxins are proteinaceous and exert a curare-like effect. Their action is very complicated. Some have a high sulphur content which in some cases is inhibited by cysteine; cobra venom contains a fraction which in turn inhibits cysteine.

It is generally agreed that the real toxic principles of snake venoms are the enzymes, which act either directly or through their influence on other reactions.

Cholinesterases are important factors in colubrine venoms, absent from viperide venoms. These esterases (the c-type cholinesterases) are the most powerful yet discovered.

Some venoms contain hyaluronidase which assists the spread of venom in the tissues. This enzyme is normally inhibited by antihyaluronidase, called anti-invasin I, which is present in serum. Rapidly spreading venoms contain a principle which inhibits anti-invasin I, and which has been called proinvasin I. There is some evidence that this may in turn be destroyed by another agent, anti-invasin II.

Viperine venom and snake tissue have been shown to contain a non-hydrolytic L-amino-acid oxidase called L-ophio-amino-acid oxidase. This enzyme acts on most monoamino monocarboxylic acids, especially leucine and methionine.

Among other enzymes so far demonstrated are proteases resembling trypsin, and erepsin, enzymes capable of converting haemoglobin into methaemoglobin.

The whole complex story is well summarized by the author.

"From the anatomical, physiological, and biochemical findings, the biological significance of snake venoms is primarily in their digestive rôle. Snakes cannot chew and mix the products of their salivary glands with the tissues of their prey. Instead, they use a highly developed injection apparatus to apply digestive agents to their food. These powerful and concentrated enzymes exert an extremely poisonous effect. . . .

"In addition to the enzymes commonly found in the digestive juices of other animals, most snake venoms contain hyaluronidase and ophio-oxidase. The poisons must spread rapidly in the body of the prey to fulfil their physiological purpose. The hyaluronic acid gel and fibers of the connective tissues are invaded through destruction of anti-invasin I by the action of proinvasin I. Venoms, especially of the Viperidae, produce other local effects, such as increased permeability, through destruction of substance surrounding the blood vessels. Lecithinases attack the lipid layer of the endothelial cell surfaces, producing lysolecithins that expand the film, with consequent increase in fragility and permeability.

"Powerful proteases lead to actual dissolution of blood vessels, causing spreading of erythrocytes and serum into the tissue. The spreading of venom is greater than can be accounted for by the hyaluronidase content and is explained by the action of lecithinases and proteases. Necrosis at the site of a bite is due to the primitive digestive properties of snake venoms.

"Ophio-oxidase is not present in all venoms and is not required for the deleterious effects of snakebite. It is a non-toxic component that causes

a protease-enhancing effect by liberating proteases and peptides bound up in the cell itself. It is a digestive agent, activating proteolytic enzymes present in the victim's body. It hastens autolysis and putrefaction. For example, the tissues of a rat injected with venom are digested about twice as rapidly as those of an untreated rat." *B. G. Maegraith*

IZARD, Y. & BOQUET, P. Recherches sur les venins de *Naja haje*, de *Naja nigricollis*, de *Lachesis gramineus* et *d'Ancistrodon piscivorus*. [**Studies on the Venoms of** *Naja haje*, *Naja nigricollis*, *Lachesis gramineus* **and** *Ancistrodon piscivorus*] *Ann. Inst. Pasteur.* 1953, May, v. 84, No. 5, 959–63.

The following is a translation of the authors' summary:—

Lachesis gramineus, a viperide of south-east Asia, secretes a necrotizing venom. *In vitro*, this venom coagulates recalcified plasma and lyses horse red cells in the presence of serum lecithins. The venom of *Ancistrodon piscivorus* of American origin is also necrotizing and has a lecithinase action, but does not coagulate recalcified plasma.

The serum "ER," which specifically neutralizes *Vipera aspis* venom, possesses a weak antitoxic activity which is paraspecific for the venom of the American viperide. It has no action on that of *Lachesis gramineus*. The venoms of the two African colubrides, *Naja haja* and *Naja nigricollis* possess neurotoxic and enzymatic properties resembling those of the Indo-chinese *Naja haja* venom, but differing from each other by virtue of the antigenic characters proper to the species to which they belong. There is, in fact, a gradation in the degree of their affinity for the antibodies corresponding to the heterologous serum C, the antivenin of *Naja haja*.

For the effective treatment of bites by snakes of a given region it is therefore essential to select from the local venomous species those whose venoms contain the antigens most likely to produce a polyvalent serum having a high antitoxic power. *H. J. O'D. Burke-Gaffney*

DAVENPORT, R. C. & BUDDEN, F. H. **Loss of Sight following Snake Bite.** *Brit. J. Ophthalm.* 1953, Feb., v. 37, No. 2, 119–21.

A European man, aged 51, was admitted to hospital in Nigeria within half an hour of being bitten on the dorsum of the left foot by an *Echis carinatus*. A tourniquet was immediately applied and, under pentothal, the bitten area was incised; 10 ml. antivenin were injected locally and 10 ml. intramuscularly. The next day his general condition was good but the incisions started to ooze blood and continued despite stypties and pressure dressings. On the third day the systolic blood pressure fell to 85 mm. Hg. and the erythrocytes to 2·5 million per cmm.; 450 ml. of blood were transfused. On the fourth and fifth days there was slight oozing from the incisions and the buccal mucosa and extensive extravasation of blood into the muscles of the buttocks and thighs where penicillin had been injected and the tourniquet applied. The haemoglobin was 60 and 65 per cent.

On the sixth day his general condition was very poor and the systolic blood pressure was 85 mm. Hg. For the first time the patient complained of lower-field blindness of the right eye. A second blood transfusion of 500 ml. at noon raised the systolic blood pressure to 120 and the general condition improved.

On the eighth day he complained of "blind spots" in the temporal field

of the left eye. On the ninth day there was no perception of light in the lower right field but no changes were seen in the discs. Haemoglobin was 65 per cent. and a third transfusion of 500 ml. blood was given. By the 11th day there was no perception of light in the left eye, and the pupil response was negligible.

On the 17th day there was loss of the lower half of the visual field of the right eye together with some retinal changes. In the left eye there was no perception of light, the pupil was inactive to direct light but the consensual reaction was normal. The optic disc was swollen with blurred edges, the veins were distended, small haemorrhages were present at and near the disc. Five and a half weeks later vision was much the same except for slight improvement in the upper temporal quadrant of the left eye. Except for pallor of the discs and arterial branching grossly attenuated in the left eye, both fundi appeared otherwise normal.

In the discussion the authors stress the importance of haemorrhagin in *Echis carinatus* venom. They believe blindness followed arterial spasm resulting from the loss of circulating blood, the spasm presumably lasting long enough only in the upper branches of the artery for complete death of the ganglion cells. The authors have not been able to find any reference to a similar case. In this case the loss of sight followed the usual pattern of such loss after haemorrhage.

[The report is of particular interest as daily records were kept from the day of the bite.] *C. J. Hackett*

Bettini, S. & Cantore, G. La terapia del morso di *Latrodectus 13-guttatus*, Rossi. Nota I—Su un caso di latrodectismo trattato con gluconato di calcio endovena. [**Treatment of** *Latrodectus* **Bite with Intravenous Calcium Gluconate**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1953, Mar., v. 34, No. 3, 136–44. [30 refs.]

The English summary appended to the paper is as follows:—

"The authors review the treatment used in various countries to cure the toxic syndroms (latrodectismus) caused in man by the bite of different species of spiders belonging to the genus *Latrodectus*. The good results obtained in America with calcium gluconate intravenously in the cure of latrodectismus by mactans are pointed out. The authors describe a case of latrodectismus by *13-guttatus* treated by them with calcium gluconate. In this case the painful symptoms definitively disappeared in a few minutes."

TROPICAL OPHTHALMOLOGY

Toulant, P. & Boithias, R. Le segment antérieur de l'oeil dans l'onchocercose. [**The Anterior Segment of the Eye in Onchocerciasis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 6, 811–18.

Lesions of the choroid, retina and especially of the optic nerve are the most serious ocular manifestations of onchocerciasis. Lesions of the anterior segment are, however, very frequent and can help in the diagnosis of this variety of filariasis.

In most patients suffering from onchocerciasis the conjunctiva contains numerous microfilariae and they are sometimes found in cases in which they

have not been found in skin snips. In some patients the microfilariae do not cause any apparent reaction or lesions in the conjunctiva, although they may cause a chronic conjunctivitis with redness, thickness, absence of all conjunctival secretions and more rarely the presence of small conjunctival nodules. These nodules are commonly about 2 mm. in diameter, reddish in colour, lying on or near the horizontal axis and at variable distances from the limbus. It is, however, in the region of the limbus that the lesions are most characteristic and frequent. In this position the microfilariae are more numerous and can find their way into the anterior chamber. Owing to phototropism of the embryos they are more numerous in the parts of the limbus not covered by the eyelids. The conjunctiva in the region of the limbus forms a rampart 2–3 mm. in thickness, red in colour, due to dilated blood-vessels and studded with minute pigmented spots, brown in colour. These are seen in African patients and less commonly in Europeans and are perhaps produced by the inflammation provoked by the microfilariae.

The most typical corneal lesion is the punctate keratitis situated in the superficial part of the substantia propria. It reveals itself chiefly by the presence of discrete spots 1½–2 mm. in diameter. These spots sometimes occur in the deep part of the substantia propria and more rarely cause a diffuse interstitial keratitis from the juxtaposition of numerous little spots, but they may present the appearance of a linear opacity which would appear to be a dead embryo. They are usually situated at first in the periphery of the cornea close to the limbus and so may not cause visual disturbance till they have later progressed towards the centre. They seem to be directly due to the presence of microfilariae in the cornea and the resulting leucocytic infiltration. Their presence causes blepharospasm, lachrymation and photophobia, and these are more readily detected in Europeans than in Africans.

Living, moving microfilariae are rarely seen in the cornea, but on the contrary dead microfilariae can often be seen with the corneal microscope and sometimes in considerable numbers. They are opaque, white in colour, rectangular in shape and lie parallel to the corneal surface.

The aqueous humour often contains more or less numerous microfilariae which are very mobile and bend and unbend quickly. They move about partly by their own mobility and partly by the circulation of the aqueous, disappear from view under the beam of the slit lamp and are not easy to follow. Disintegrating microfilariae may form a "false hypopyon" situated at the bottom of the anterior chamber, drawing down the margin of the iris which makes the pupil pear-shaped. The presence of microfilariae in the anterior chamber gives a definite diagnosis of *Onchocerca volvulus* as the embryos of other varieties of filarial worms are not found in the aqueous humour.

A diffuse atrophy of the iris may often be seen. At first the surface is smooth, then becomes dull with the presence of minute hollows and later the pigment disappears, giving the appearance of a sponge and described as the "pumice stone iris." Plastic iritis, with more or less widespread synechiae, is not rare but seclusions of the pupil with glaucoma have not been seen by the authors.

The ciliary body is rarely involved. Cataract is common in people over 40 years who show filarial lesions. The cataract is central, without cuneiform opacities; but other factors besides onchocerciasis must be considered in the aetiology, such as the bright light of the tropical sun.

Treatment with notezine [hetrazan] and moranyl gives excellent results. The authors point out the benefit of local and subconjunctival therapy, and

the importance of early diagnosis and treatment before severe lesions of the retina and optic nerve can occur. *E. W. O'G. Kirwan*

See also p. 837, PIERS, **Onchocerciasis with Cutaneous Lesions in a European.**

TANIGUCHI, T., KAWAMURA, R. & OKUNO, Y. **Studies on the Elementary Body of Trachoma and Paratrachoma.** *Med. J. Osaka Univ.* 1953, Jan., v. 3, No. 4, 711–16, 15 figs. on 4 pls. [16 refs.]

"The inclusion body (Prowazek body) and the elementary body were distinguished by the Eosin-Giemsa staining in the infected epithelial cells of trachoma and paratrachoma (Inclusion blennorrhea and Follicular conjunctivitis).

"The Prowazek body corresponds to the inclusion body found in various other viral diseases, and are made up of cellular substance chiefly stained bluish-purple (the 'Initialkörperchen', 'Restkörper', etc.), which may probably be a degenerative product of the nucleus, and the elementary bodies which stain as reddish purple granules. In analogy to the relation of elementary bodies and the inclusion bodies of other viral diseases we consider the elementary bodies found in the Prowazek body to be the causative agents of these diseases. The recognition of morphologically indistinguishable inclusion bodies and elementary bodies found in trachoma and paratrachoma lesions does not contradict with the specificity of the pathogenic agents, because these diseases are of a very similar nature."

HEAT STROKE AND ALLIED CONDITIONS

BLACK, D. A. K. **Body-Fluid Depletion.** *Lancet.* 1953, Feb. 14 & 21, 305–11; 353–60; 6 figs. [Numerous refs.]

These two papers give a full discussion of the physiology, clinical implications and treatment of body-fluid depletion.

They do not lend themselves to abstraction and those interested are recommended to consult the originals.

MISCELLANEOUS DISEASES

COTTEW, G. S. **Melioidosis in Sheep in Queensland. A Description of the Causal Organism.** *Australian J. Exper. Biol. & Med. Sci.* 1950, Nov., v. 28, Pt. 6, 677–83, 4 figs. [11 refs.]

This is the first record of natural melioidosis in sheep and the first isolation of Whitmore's bacillus in Australia. *Malleomyces pseudomallei* [*Pfeifferella whitmori*] was isolated from pus from abscesses in the lungs of two sheep in the same flock in Queensland. The organism was typical in its morphology and in its cultural and biochemical behaviour, and it produced characteristic lesions on inoculation into guineapigs and mice.

The strains also regularly produced abscesses in the pancreas, a finding not mentioned by previous workers.

Intramuscular injection of 4 ml. of a broth culture into an adult Merino ram caused death in 12 days. There was an intense purulent conjunctivitis and a thick yellow nasal discharge, the septum being studded with abscesses. There was an abscess at the site of injection, the regional glands were purulent, and multiple abscesses were present in the spleen and lungs. Intravenous injection produced death with signs of polyarthritis and similar nasal lesions. Sheep receiving the organism conjunctivally and orally did not die, though the former showed signs of encephalitis; no significant lesions were found on post-mortem examination of either animal, and the organism was not isolated from the tissues.

The outbreak will be described elsewhere. *J. C. Cruickshank*

BRYGOO, E. R. Action du chloramphénicol sur le bacille de Whitmore. [**The Action of Chloramphenicol on Whitmore's Bacillus**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 169–72, 1 graph.

The effect of chloramphenicol was tested *in vitro* on 36 strains of *Pfeifferella whitmori* from 24 human cases of melioidosis in Saigon. A bacteriostatic action was observed with a mean concentration of 70 u./ml. [*sic*] (with extremes of 15 and 250 u./ml.), and a bactericidal action with 296 u./ml. (with extremes of 60 and 1,000 u./ml.). [The unit referred to is probably 1 microgramme.]

A strain of average sensitivity was used to infect guineapigs subcutaneously in a dosage of about 4,000 organisms. In two groups treatment with chloramphenicol was given subcutaneously from the day before infection for 20 days or until death occurred. Untreated animals died with typical signs in an average time of 8·8 days, and animals receiving a daily dosage of 75 mgm./kgm. per day of chloramphenicol in about the same time (average 8·1 days). The group receiving 150 mgm./kgm. per day survived considerably longer (average 14·3 days) but all the animals died ultimately with typical signs of melioidosis. Organisms recovered from the treated animals did not show signs of drug-resistance.

In discussion, BRUMPT reported the favourable results of treatment of a case of subacute melioidosis with chloramphenicol. *J. C. Cruickshank*

BRYGOO, E. R. Action de la néomycine sur le bacille de Whitmore. [**The Action of Neomycin on Whitmore's Bacillus**] *Bull Soc. Path. Exot.* 1953, v. 46, No. 2, 216–21, 2 charts.

Twenty-nine strains of *Pfeifferella whitmori* from 20 human cases of melioidosis were tested for sensitivity to neomycin. In almost all the tests a bacteriostatic effect was observed with 24 u./ml. and in two-thirds of them with 6 u./ml. A bactericidal effect was noted with concentrations ranging from 6 to 36 u./ml. [The neomycin used contained 192 units per milligramme.]

A strain of average sensitivity *in vitro* was used to test the efficacy of the drug in guineapigs. Even a very large daily dosage of neomycin (130 mgm./kgm. = 25,000 u./kgm.) failed to influence the course of experimental infection. *J. C. Cruickshank*

JELLIFFE, D. B. **Lymphostatic Verrucosis in a Ten Year Old Yoruba Boy.** *West African Med. J.* 1953, Apr.-May-June, v. 2 (n.s.), No. 2, 100–101, 2 figs.

WILKINSON, J. **The Incidence of Onyalai.** *East African Med. J.* 1953, Apr., v. 30, No. 4, 161–6. [23 refs.]

In this paper the author discusses the incidence and distribution of onyalai. It would appear that, for practical purposes, the disease is seen only in Africa, and, further, in Africa itself it is mostly confined to that part of the continent bounded by the Equator in the north, the south latitude 28° in the south, the sea coast in the west, and in the east by a line drawn from the Kenya Highlands down to and along the eastern boundary of the Rhodesias and the Transvaal. Its greatest frequency, however, is in the Rhodesias, Angola and Bechuanaland.

As far as can be determined, no clear environmental factors are associated with the incidence of onyalai. It is liable to affect the urban just as the rural African. Nor does the season of the year appear to play any clear or obvious rôle. Diet too apparently is not related to it, for the disease is seen in the well-fed as well as in the poorly nourished. No genetic factor appears to be concerned with its causation.

Onyalai is encountered mostly in the young adult stage of life, but no age is immune. It occurs mostly in men; in 160 cases recorded in the literature some 69 per cent. were in males. [It must be pointed out, however, that the hospitals cater mostly for men, and in the urban areas there is an excess of males due to industry.]

Whether onyalai is seen in races other than the Bantu is not certain, but it would appear that this bleeding syndrome may occasionally occur in the European living in Africa; it is then indistinguishable from onyalai as seen affecting the African. *Michael Gelfand*

MISRA, S. S., GUPTA, B. M. & HAMEED, S. **Tropical Eosinophilia. Clinical and Experimental Investigation.** *Indian J. Med. Sci.* 1953, Mar., v. 7, No. 3, 120–36, 5 figs. [29 refs.]

From August 1951 to January 1952, 40 cases of this condition were studied by the authors in Lucknow. Cough and dyspnoea were the most common symptoms, while the commonest physical signs were harsh vesicular breathing with prolonged expiration often associated with rhonchi and crepitations. Most patients lost weight. No enlargement of spleen, liver or lymph glands was found in the whole series. The blood showed a leucocytosis reaching a maximum of 25,000 cells per cmm. and the eosinophiles averaged 80 per cent. Sternal puncture showed an increase in eosinophile myelocytes in 3 out of 4 patients whose marrow was examined. No mites were found in the sputum or helminths in the stools.

Chest X-rays were normal in many cases, in others there was an increased striation and fibrosis; a miliary appearance was rare.

Arsenic, in the form of NAB or acetylarsan cured most patients, a total of 1·8 to 2·0 gm. being necessary. Intravenous injections of TAB vaccine were useful where arsenic was ineffective.

Mice and monkeys inoculated with the serum and sputum of patients suffering from tropical eosinophilia showed an increased eosinophile count within 20 to 40 days. Haemagglutination experiments and inoculation of chick embryos gave inconclusive results. The authors consider that the disease may be due to a virus. *H. T. H. Wilson*

PROTOZOOLOGY: GENERAL

KUNERT, H. & SCHMIDTKE, L. Zur Übertragung von *Toxoplasma gondii* durch Fliegen. [**Transmission of *Toxoplasma gondii* by Flies**] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 136, No. 2, 163–73. [32 refs.]

The object of the experiments described in this paper was to determine whether transmission of toxoplasmosis can take place through contamination with the infected faeces of flies or by ingestion of the infected insects themselves. For this purpose the following species were used: *Stomoxys calcitrans*, *Calliphora erythrocephala*, *Musca domestica* and *Lucilia sericata*. The flies were infected by feeding them on a saline suspension of the peritoneal exudate of mice infected with *Toxoplasma*, which was concentrated by centrifugation. Clean mice were fed with the faeces, and with the dissected guts and salivary glands of flies which had ingested the infected material. Infection with the faeces was successful only in one mouse, 24 hours after the fly had had an infective meal, and the saliva remained infective to mice only as long as the food was retained in the crop of the fly, *i.e.*, up to 24 hours. However, mice fed on infected insect guts failed to become infected. *C. A. Hoare*

OTTEN, E. Vergleichende Untersuchungen über das serologische Verhalten des Sabin-Feldman-Farbtestes zur Toxoplasmose-Komplementbindungsreaktion nach Westphal. [**Comparison of Sabin-Feldman's Dye Test and Westphal's Complement-Fixation Test for the Serological Diagnosis of Toxoplasmosis**] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 136, No. 2, 133–40.

For the evaluation of the serological tests used in the diagnosis of toxoplasmosis, the author compared the results obtained with Sabin-Feldman's dye test and Westphal's complement-fixation test, by other German workers and by himself, the total number of human sera tested by both methods being 1284. In 774 (60·2 per cent.) of these the results were identical, but in 140 (10·8 per cent.) the results were contradictory, while in 370 cases (28·8 per cent.) they were uncertain, a doubtful reaction by one method being negative or positive by the other. If it is taken into consideration that the antibodies responsible for the two reactions differ in their susceptibility to mechanical disturbances (*e.g.*, during transport of the serum, etc.) it would seem that there was a discrepancy between the two tests only in 6·3 per cent. of cases, a variation in 8, and complete agreement in 75·4. In the case of the complement-fixation tests anti-complementary sera may be responsible for some of the conflicting results. These can be reduced by observing sterile precautions in the collection of sera and by avoiding delay in their transport. *C. A. Hoare*

JACOBSSON, E. Toxoplasmainfektion. [**The Signs and Symptoms in Toxoplasmosis.** *Nordisk Med.* 1953, June 5, v. 49, No. 23, 815–17.

The English summary appended to the paper is as follows:—

"The clinical symptoms of toxoplasmosis, especially the milder forms, are not yet fully known and are therefore of special interest. The author has observed two cases of clinically manifest toxoplasmosis in a boy and his father—with a syndrome suggesting, perhaps, a transition to subclinical forms. The boy, 7 years of age, showed general benign lymphadenosis with elevated sedimentation rate and increased white blood count as well as moderate eosinophilia, though without fever and with a dye-test titre of

1/8,000. The father, who fell ill 10–11 days after his son, developed fever and moderate headache. After about 8–10 days, the fever had fully subsided. There was a marked intracutaneous reaction and a dye-test positive in a dilution of 1/4,000. When the fever had gone, the father recovered completely, while the son still showed some enlargement of the lymph nodes, but no other symptoms, for about one year after the first examination."

SENECA, H. & IDES, D. *In Vitro* **Action of Isonicotinic Acid Hydrazide on Protozoa.** *Antibiotics & Chemotherapy.* New York. 1953, Mar., v. 3, No. 3, 241–2.

"Isonicotinic acid hydrazide inhibits the growth of *Endameba histolytica* in 500 gamma per ml. but is inactive against *Leishmania donovani*, *Leishmania tropica* and *Trypanosoma cruzi*, *Trichomonas vaginalis*, and *Trichomonas foetus*."

JÍROVEC, O., SOYKA, O., ZÁZVORKA, Z. & VOLDŘICH, L. *Sergentella spiroides* n.sp. ein neuer Blutparasit des Menschen. [*Sergentella spiroides*, **n.sp., a New Blood Parasite of Man**] *Zent. f. Bakt.* I. Abt. Orig. 1953, Apr. 30, v. 159, No. 5, 380–83, 4 figs. on pl.

The authors refer to the literature about the two known species of the genus *Sergentella*, the zoological position of which is doubtful, and they describe, with photographic illustrations, a new species of the genus named by them *S. spiroides*, which they found in the blood of three patients in Prague and Most. All the patients had anaemia.

The first patient, aged 50, had lived a long time in East Poland before he returned to Prague. The specimen of *S. spiroides* found in his blood measured 116 by 1·6 to 2 μ. Its thread-like body, coiled in a spiral, stained almost uniformly blue with brilliant cresyl blue and showed some darker, more reddish-violet bodies, which were possibly nuclei. One end was pointed, the other rounded. The whole spiral lay inside a spherical mucous envelope, with a diameter of 23 μ, which did not stain. Blood examinations repeated every two hours during the next 3 days and nights, examinations of numerous thick blood films and two concentrations of 5 cc. of blood, all failed to reveal any other specimens of the parasite.

The history of the second patient, a female teacher aged 25, is given. Sternal puncture revealed, in this case, 3 specimens of *S. spiroides* in 10 preparations made from the material obtained. A second sternal puncture revealed one specimen in 12 preparations. Third and fourth sternal punctures did not reveal any. Repeated examinations of the peripheral blood were negative. Two of the specimens found had the characteristic spiral form and two lay in a looser spiral enclosed in a mucous envelope. As in the other case, one end of the organism was pointed, the other rounded, and structures which may have been nuclei were present. The sizes of these four specimens were 83×2, $82 \times 1{\cdot}3$, $64 \times 1{\cdot}2$ and $48 \times 1{\cdot}2$ μ respectively. Cultivation on blood agar, nutrient agar and Sabouraud agar was negative and attempts to infect rabbits failed.

The third patient, a female aged 46, died in hospital; the history is given. At post-mortem examination one specimen of *S. spiroides* was found in a smear of pus from a gluteal abscess. This measured $96 \times 1{\cdot}5$ μ and it lay in a finely-granular mucous envelope with numerous leucocytes round it. In 1942 Fingerland found a parasite thought by the authors to be *S. spiroides* in a blood smear since lost. If this was *S. spiroides* it is the fourth known case of the infection in Czechoslovakia.

S. spiroides differs as follows from the two other known species *S. yakimoffi* and *S. anthropitheci*: It is coiled in a spiral, while the other two species are either straight or only lightly bent in the shape of an S. It is much longer. It contains several structures resembling nuclei, while the other species contain only one or two of these. It is enclosed in a mucous envelope, which shows a finely granular structure and is best shown by staining with brilliant cresyl blue. If further work shows that the spherical phases seen by the authors are developmental phases of either of the two known species, the older name will naturally have priority. [See also this *Bulletin*, 1953, v. 50, 158.] *G. Lapage*

CHATTERJEE, K. D. **Human Parasites and Parasitic Diseases for Students, Laboratory Workers, Practitioners of Medicine and Public Health.**

This book is reviewed on p. 868.

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

WALLIS, R. C. **A Technique for Micromanipulation of Mosquitoes.** *Mosquito News.* 1953, Mar., v. 13, No. 1, 15–16, 1 fig.

BURTON, G. J. **Some Techniques for Mounting Mosquito Eggs, Larvae, Pupae and Adults on Slides.** *Mosquito News.* 1953, Mar., v. 13, No. 1, 7–15.

CHOW, C. Y. & YUE, T. F. **The Status of certain Insects and Mites as Vectors of Human Diseases in Taiwan (Formosa).** Reprinted from "*Essays and Papers in Memory of Late President Fu Ssu-nien*", 1952. 10 pp. [19 refs.]

The topography and climate of Taiwan (Formosa) is briefly outlined. About one million of a population of 7½ million came to the island from the China mainland during the past 3 or 4 years.

Transmission of malaria (*P. vivax*, *P. falciparum*, and *P. malariae*) is by *A. minimus* in the hills and *A. hyrcanus sinensis* in the plains. It is uncertain if the cases of filariasis (*W. bancrofti*) are indigenous. *Culex fatigans* and *A. hyrcanus sinensis* which are recorded as vectors on the Chinese mainland, occur on the island; filariae observed in this anopheline on the island are not certainly human in origin. Although known in the past there have been no outbreaks of dengue in Taiwan in recent years; *Aëdes aegypti* and *Aëdes albopictus* are regarded as the vectors. Nearly 30 cases a year of Japanese B encephalitis have been reported recently, and *Culex tritaeniorhynchus*, from which the virus has been isolated in Japan, is known in Taiwan, sometimes being present in human dwellings.

Kala azar has not been reported and *Phlebotomus* are not commonly seen. *Musca domestica* and *Chrysomyia megalocephala* (breeding respectively in garbage or faeces, and mainly in human excrement) are considered to play a part in the dissemination of the excremental diseases which are, except for cholera, of yearly incidence. The last cholera outbreak was in 1946. Few cases of plague now occur. *Xenopsylla cheopis* is widespread. Rat fleas and rat mites (*Bdellonyssus bacoti*) occur in "rather large numbers"

and the head louse is prevalent in children. Cases of murine typhus, epidemic typhus or relapsing fever are not known for Taiwan. Scrub-typhus is endemic and exists both in the hills and on the plains. *Trombicula akamushi* is the only recorded vector and *Rattus losea*, *R.r. rufescens* and *Apodemus agrarius* are considered as reservoirs. In some parts *T. akamushi* occurs in native gardens.

The paper concludes with a check-list of 62 species of mosquito, including 16 anophelines, and 10 species of flea from the island. *D. S. Bertram*

SOMMERMAN, Kathryn M.; FOOTE, R. H. **Pictorial Keys to the Mosquitoes of Medical Importance. I. Korea** [SOMMERMAN]. *Mosquito News.* 1953, Mar., v. 13, No. 1, 18–20, 1 fig. **II. Formosa** [SOMMERMAN & FOOTE]. *Ibid.*, 20–22, 2 figs.

The species of mosquitoes named in these pictorial keys for the identification of their adults and larvae are, for Korea: *Anopheles hyrcanus sinensis* (malaria, bancroftian filariasis and possibly Japanese B encephalitis), *pattoni* and *maculipennis atroparvus* [it is not claimed that *A. pattoni* and *A. m. atroparvus* are found in Korea, merely that they may spread to Korea from their present haunts], *Culex tritaeniorhynchus* (found naturally infected with Japanese B encephalitis virus) and *Aëdes albopictus*. For Formosa: *Anopheles h. sinensis* and *minimus* (malaria vectors) *maculatus*, *tessellatus*, *annularis* and *sundaicus* (malaria vectors in certain circumstances), *Aëdes aegypti* and *albopictus* (dengue vectors).

Other mosquitoes are present in both countries, but only the above are regarded as of primary medical importance. *H. S. Leeson*

LUMSDEN, W. H. R. & VAN SOMEREN, E. C. C. **Records of *Culex* species (Diptera: Culicidae) from West Nile District, Uganda, with Notes on their Behaviour.** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1953, Feb. 15, v. 22, Pts. 1/2, 19–22.

"(1) The species of *Culex* collected in West Nile District, Uganda, in March and April, 1950, are reported, together with short notes on their behaviour.

"(2) Attention is directed to *C.(C.) univittatus* var. *neavei* as possibly concerned in the maintenance of yellow fever virus among the wild monkey population of the district."

LEWIS, D. J. **The *Stegomyia* Mosquitoes of the Anglo-Egyptian Sudan.** *Ann. Trop. Med. & Parasit.* 1953, Mar., v. 47, No. 1, 51–61, 7 figs. [49 refs.]

The known distribution of the following mosquitoes of the sub-genus *Stegomyia* in the Anglo-Egyptian Sudan is described and mapped: *Aëdes aegypti*, *Aëdes metallicus*, *Aëdes simpsoni*, *Aëdes luteocephalus*, *Aëdes africanus*, *Aëdes apicoargenteus*, *Aëdes unilineatus* and *Aëdes vittatus*. Their possible rôle as vectors of yellow fever is considered and control measures are reviewed.

The Sudan includes the northern limits in this part of Africa of these species. *Aëdes apicoargenteus* has been found not to transmit yellow fever by bite; *Aëdes unilineatus* has not been tested and the remaining 6 can all transmit the virus by bite.

Areas of special interest are: the Imatong mountains where monkeys of 3 species occur but where *Stegomyia* mosquitoes have not been recorded

apart from *Aëdes africanus*; the Nuba Hills where *Aëdes vittatus* breeds in rock pools and other species in tree holes; Jebel Moya which is inhabited by rock hyraxes and where *Aëdes vittatus* is found; the Blue Nile Sunt forests where a grey monkey is abundant and *Aëdes metallicus* and *Aëdes luteocephalus* are common.

Dengue has not been known in the Sudan for many years. West Nile virus has been active in parts of the country and there is evidence of the existence of St. Louis and Japanese B viruses.

Well-known control measures are directed against *Aëdes aegypti* in many towns and villages and other species are controlled where possible. Port Sudan and the aerodromes receive special attention. In periodical reports *Aëdes aegypti* indices are seldom high and are often nil. *H. S. Leeson*

NIELSEN, E. T. & NIELSEN, A. T. **Field Observations on the Habits of** *Aedes taeniorhynchus*. Reprinted from *Ecology*. 1953, Jan., v. 34, No. 1, 141–56, 6 figs. [11 refs.].

The salt marsh mosquito *Aëdes taeniorhynchus* can be a great nuisance and is among Florida's worst insect pests.

On the Atlantic coast of Florida is an off-shore bar separated from the mainland by a lagoon. The mosquito was studied in the field over an area along a narrow road, which traversed this bar, passing through a number of plant associations, mangrove, grassland, oak and palm forest, palmetto scrub and an orchard of guava and mango.

In this area egg-hatching depended solely upon rain; most of this falls erratically as thunder showers. Thus, after each rainfall a brood of larvae commences to grow: in 1951 there were 9 such broods from April to July.

The eggs hatched soon after the rain, and the larvae showed a total aquatic period of 9–15 days. This period varied with the brood and retardation occurred in one brood until the 19th day. The first instar remained close to the bottom, whereas later stages surfaced.

The larvae show a tendency to congregate. They may cluster anywhere in the pool, sometimes along the border of vegetation or dry ground. This tendency to congregate is called "balling up" when the larvae swim rapidly about in spherical clusters, 10–15 cm. in diameter, appearing as a solid mass when seen from a distance. Pupae may also ball up.

The larval predators found were minnows, water beetles and predatory mosquito larvae.

It was impossible to mark adults by exposing larvae in solutions of methylene blue, Giemsa, and methyl violet. Adults were successfully marked in the field by dusting with a mixture of aniline dyes and wheat flour.

The adults spend most of their life in places as yet unknown. Newly emerged mosquitoes remain 12–24 hours in the vicinity of the pool from which they emerge; males and females emerge at the same time. During the following 3 days they probably disperse over a considerable area, but this is not conclusively proved.

Females show a 5-day cycle, they bite when they are 4, 9, 14 days old, and lay eggs when they are 7, 12, 17 days old; they have a particularly slow and graceful flight at this time. Light has slight attraction to females ready to lay eggs; but all other adult stages are repelled by light. The occurrence of males in light traps is unexplained. Females lives 3–4 weeks, and the older females may bite but do not lay eggs. Mating probably takes place in the first days of life; it was not observed in the swarms.

The males form swarms from the age of 4 days until they are 2–3 weeks old. Each individual swarms each evening and each morning and only participates for about 1½ minutes, a fraction of the total duration of the

swarm. It is postulated that the duration of the swarm depends upon the range of variation in individual sensitivities to an unknown stimulus. The midpoint of the swarming time is on average 4 minutes after the end of "civil twilight" in the evening and 4 minutes before the beginning of twilight in the morning. *M. C. Williams*

REEVES, W. C. **Quantitative Field Studies on a Carbon Dioxide Chemotropism of Mosquitoes.** *Amer. J. Trop. Med. & Hyg.* 1953, Mar., v. 2, No. 2, 325–31, 1 fig.

"Carbon dioxide, released at rates of approximately 25 ml., 250 ml. and 2,500 ml. per minute, was successfully employed as a host-simulating mosquito attractant. These rates were selected because they represent approximately the average amounts of carbon dioxide given off by chicken, man, and horse or cow, respectively.

"Large numbers of female mosquitoes of several species were attracted into traps baited with these concentrations of carbon dioxide. The various species of mosquitoes responded differently. *Aëdes nigromaculis* was attracted in the greatest numbers to the higher concentrations. More *Culex quinquefasciatus* were attracted to the least amount. *Culex tarsalis* was greatly attracted to all three concentrations, but the largest numbers were attracted to the traps where the rate of release was highest. These observations are correlated with available knowledge of the host-preference habits of these species and they suggest a direct interrelationship of host-seeking and carbon dioxide chemotropism.

"These observations are of potential value in epidemiological studies of mosquito-borne diseases and offer a new investigative tool in such research."

TRAVIS, B. V., APPLEWHITE, K. H., FRITH, G. R. & GOLDSMITH, J. B. **Additional Observations on the Control of Mosquito Larvae in Alaska with DDT.** *Mosquito News.* 1953, Mar., v. 13, No. 1, 1–3.

Earlier papers by Travis and others have reported the results of aeroplane spraying trials with DDT against adult and larval mosquitoes in Alaska [see this *Bulletin*, 1951, v. 48, 91]. One of the plots, 25 sq. miles in area, used in the earlier trials had been sprayed 3 times with DDT at 0·1 lb. per acre in 1948. In 1949, this plot was enlarged to 100 sq. miles and again sprayed 3 times at the same rate. Finally the original 25-sq.-mile plot was treated with one further dose of 0·1 lb. per acre, giving a total of 0·7 lb. per acre during 2 years, surrounded by an area dosed with 0·3 lb. in the second year. The spray used was a 20 per cent. solution of DDT in a mixture of fuel oil and aromatic auxiliary solvents.

The results of all these treatments were gauged in 1950 by larval counts to assess populations in treated and untreated areas and to compare numbers found in 1949 and 1950. The larval dips were made every half mile along transects at right angles to a road running through the centre of the treated area. The results were finally assessed from 1,225 dips in both the inner and outer treated zones and compared with 280 dips from an untreated area.

Average numbers of larvae per dip were 0·29 in the outer treated area 0·08 in the inner zone and 21·9 in the untreated area. These indicat reductions of 98·7 and 99·6 per cent. respectively. Estimates based o comparison of 1949 and 1950 larval populations indicated reductions o 95 per cent. and 89 per cent. respectively.

Some inconclusive trials of different formulations of DDT are als reported in this paper. *J. R. Busvine*

KNIPE, F. W. & FRINGS, H. **Oviposition by House Flies.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 155–6.

It is possible that house-fly cultures are contaminated by free flies in the laboratory which are able to extend the surprisingly long ovipositor through small crevices and place their eggs on larval media. Tests have been made to determine the maximum distance to which the flies would reach with the ovipositor if the medium was beneath the cage, this distance was found to be 12 mm., but at distances above this eggs were dropped on to the medium, the odour apparently acting as a stimulus.

Accurate determination of the distance at which eggs could be laid by extending the ovipositor was made by placing the medium above the cage. Eggs in well-formed clusters were laid at distances up to 11 mm., but fewer numbers than previously were obtained at distances over 6 mm.

Anne Hudson

ROTH, A. R., LINDQUIST, A. W. & TERRIERE, L. C. **Effect of Temperature and the Activity of House Flies on their Absorption of DDT.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 127–30.

It has long been known that the temperature at which flies are kept after treatment with DDT affects the kill, fewer flies being killed when maintained at a high than at a low temperature.

A batch of DDT-resistant house-flies, treated individually on the thorax with 8 μgm. of radioactive DDT in acetone at 75°F. was divided into two, half being maintained at a temperature of 70°F. and the other half at 90°F. The mortality after 20 hours at 70°F. was 74 per cent. and at 90°F. only 41 per cent., yet the amount of DDT absorbed was greater at the higher temperature than at the lower. DDT was absorbed within the first hour of treatment, and gradually increased up to 5 or 6 hours. The total amount of DDT, recovered, both by washing the outside of the flies, and by determining the amount of DDT or DDT metabolites within the fly was less than the total amount of DDT applied.

Although the activity of a fly increases with increase in temperature there was no significant difference between the amount of DDT absorbed by active flies and by flies immobilized with carbon dioxide. Less than one per cent. of the total amount of DDT applied was found in the excrement and about 15 per cent. of the total absorbed was accounted for in this way over a 7-day period. There was no evidence that DDT was metabolized to carbon dioxide by treated flies.

It is suggested that the higher survival of DDT-treated flies at high temperatures is due to a greater and more rapid metabolism.

C. Mary Harrison

GILBERT, I. H., COUCH, M. D. & MCDUFFIE, W. C. **Development of Resistance to Insecticides in Natural Populations of House Flies.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 48–50.

There was no evidence of the resistance of house-flies to insecticides in the Orlando district of Florida in 1947, but in 1948 and the following years resistant flies became well established.

The development of resistance was traced by laboratory tests on field-collected female flies. The flies were exposed under half Petri dishes to plywood panels treated with 25 mgm. per sq. ft. of insecticide. Flies tested in May, 1950, showed a marked increase in resistance over previous years. Sprays and aerosols containing lindane, dieldrin and pyrethrum no longer

gave a practical control. Flies in one dairy which had a resistance to DDT 12 times that of a normal laboratory colony in the spring (when measured by the lethal time 50) were 40 times more resistant than the laboratory colony by midsummer.

Flies collected from 5 dairies which were regularly treated with various insecticides had a high degree of resistance to DDT early in 1950 and this resistance increased over the season in some instances. There was also a considerable increase in the resistance to DDT with the synergist K-3926 in most of these strains. The resistance of these flies to lindane and to lindane with the synergist RE-1901 was relatively low in June but by the autumn it had increased considerably.

Flies from the Lakemont dairy which had been treated regularly with chlordane for 3 seasons were not resistant to this insecticide in the spring of 1950 but had a resistance of 15 times to DDT. At the end of the summer a resistance of 24 times had developed to chlordane, the DDT resistance had increased and there was also a high resistance to lindane.

In another dairy which had been treated with toxaphene in 1949, the flies showed no resistance to this insecticide in the spring of 1950 but were moderately resistant to DDT. By the autumn, however, toxaphene was ineffective. *C. Mary Harrison*

PIMENTEL, D., SCHWARDT, H. H. & DEWEY, J. E. **Development and Loss of Insecticide Resistance in the House Fly.** *J. Econom. Entom.* 1953, Apr., v. 46, No. 2, 295–8.

DDT-resistant house-flies collected from a dairy barn were bred in the laboratory for 3 generations and then selected with DDT for a higher resistance. Large numbers of flies were exposed in wire screen cages treated with DDT at 4,000 mgm./sq. ft. until a 98 per cent. knock-down was achieved. This selection was practised over 5 generations and in the succeeding generations the flies were allowed to emerge directly from the pupae into cages heavily treated with DDT. In the fifth generation 3 per cent. of the flies survived 2½ weeks on a deposit of 4,000 mgm./sq. ft., but by the 20th generation 70 to 80 per cent. survived an exposure of 2 weeks. With the increase in DDT resistance there was also a slight increase in resistance to lindane, dieldrin and parathion. When the DDT-resistant strain was maintained in the laboratory without being exposed to DDT there was a gradual loss of resistance over 22 generations. One stock of flies having a low level of DDT resistance, and another non-resistant stock, were subjected to selection with lindane to the 98 per cent. level. In both stocks the resistance to lindane increased rapidly and there was no significant difference between the rates at which resistance increased. The stock which was resistant to lindane alone lost its resistance rapidly when no longer exposed to this insecticide.

Selection with dieldrin on two DDT-resistant strains of house-flies collected from dairy barns in New York State led to a slow increase in resistance to dieldrin. After 10 generations the resistance to dieldrin was 3 times that of the first generation, while the resistance to DDT remained the same or increased slightly. Selection with parathion, over 10 generations on different field-collected DDT-resistant strains, gave resistance to this parathion, 9 times as great as that in the first generation. Resistance to DDT also increased in this strain.

The authors suggest that since DDT resistance does not decrease when selection with other substances is taking place, control of resistant flies by using a number of different insecticides in rotation would be impossible. *C. Mary Harrison*

HADJINICOLAOU, J. & HANSENS, E. J. **Chlorinated Hydrocarbon Insecticides to control House Fly Larvae.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 34–7.

The authors tested the effectiveness of a number of insecticides against larvae of resistant and normal house-flies.

In laboratory tests larvae were placed in media in lacquered flower pots, and the insecticides were added as emulsions when the larvae were half grown. Aldrin, dieldrin and heptachlor all proved to be effective as larvicides at dosages as small as 5 mgm. of active ingredient per kgm. of media. Chlordane, toxaphene and dilan were slightly less effective and considerably larger quantities of DDT, methoxychlor and lindane were necessary to kill all the larvae.

In field tests in dairy barns and turkey pens dieldrin, aldrin, chlordane and heptachlor were used at approximately 10 times the dosage used in laboratory tests. Treatment of floors, gutters and calf stalls in 3 dairy barns with aldrin, heptachlor and chlordane did not reduce the numbers of adult flies significantly, although the larvae in heavy breeding areas were reduced. Light breeding areas were less readily detected, however, and probably escaped treatment.

The treatment of manure in turkey pens proved that dieldrin and aldrin were more effective than chlordane and heptachlor. Four treatments were made from June 17th to July 24th but with successive treatments the effectiveness of the insecticides decreased. Similar results were obtained with aldrin used on a poultry farm, and dieldrin on a large manure pit. Adult flies collected from these 3 areas proved to be considerably more resistant to all the insecticides than a normal laboratory strain. The use of insecticides against larvae led to a more rapid development of resistance than the use of insecticides against adults alone. *C. Mary Harrison*

GOODWIN, W. J. & SCHWARDT, H. H. **House Fly Control in New York State Dairy Barns.** *J. Econom. Entom.* 1953, Apr., v. 46, No. 2, 299–301.

"A total of 172 dairy barns were treated during a 2-year period using three application methods. The materials used were lindane wettable powder and emulsion, dieldrin wettable powder and emulsion, DDT wettable powder, DDT wettable powder with K3936, lindane emulsion with Re 1901, dilan wettable powder, and methoxychlor plus lindane. None of these toxicants tested in the overall and spot methods gave effective control in 1952. The strip methods gave effective control for 2 years if dieldrin had not been previously used, but resistance built up during the third year.

"Sanitation is of the utmost importance controlling flies in dairy barns and cannot be stressed too much."

HANSENS, E. J. **Failure of Residual Insecticides to control House Flies.** *J. Econom. Entom.* 1953, Apr., v. 46, No. 2, 246–8.

"From 1949 to 1952 wettable powders of lindane, methoxychlor, chlordane and dieldrin and lindane emulsion applied as residual sprays to walls and ceilings of dairy barns gave house-fly control for a month or more after each application depending on fly breeding conditions. Of these materials, lindane and methoxychlor were recommended for use in dairy barns because of their faster killing action and greater safety. In 1952 all of these materials failed to give control and the best alternate material also

did not give control. Laboratory studies showed resistance of seven strains of flies to the insecticide used in the barn from which the strain was collected, the alternate material tested in that barn, and to DDT. Extensive tests with fly strains from four of these barns showed the flies were very resistant to all five insecticides."

HANSENS, E. J. & BARTLEY, C. E. **Three New Insecticides for Housefly Control in Barns.** *J. Econom. Entom.* 1953, Apr., v. 46, No. 2, 372–4, 1 fig.

The three compounds used in field experiments for house-fly control were:

(1) Pyrolan (1-phenyl-3 methyl-pyrazol-(5)-dimethyl carbamate),
(2) Pyramat (2-N-propyl-4-methyl-pyrimidyl-(6)-dimethyl carbamate),
(3) Diazinon (O-O-diethyl-O-(2-isopropyl-4-methyl-pyrimidyl (6)) thiophosphate.

These substances are all readily soluble in most organic solvents and are rather more toxic to rats than DDT (the oral LD50 ranges from 53·5 to 200 mgm./kgm.) Barns having good sanitation were treated with wettable powders of the insecticide applied at the rate of 1 gallon of spray to 400 sq. ft. of walls and ceilings. Tests were made in barns where no insecticides had been used previously, and where the flies were non-resistant, and also in barns previously treated with several different insecticides and where the house-flies showed a high degree of resistance. One per cent. pyrolan in combination with 1 per cent. methoxychlor controlled non-resistant flies for only 2 weeks. Pyramat also had very little residual effect, but gave a very rapid knock-down, and it is suggested that because of this property pyramat may prove useful when combined with other insecticides. One per cent. Diazinon with 1 per cent. methoxychlor proved to be the most effective insecticide, and gave excellent control of non-resistant flies for 10 weeks and of resistant flies for 4 weeks. *C. Mary Harrison*

FARRAR, M. D. & BRANNON, C. C. **Fly Control on Dairy Farms.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 172.

Many of the new methods of fly control recommended to farmers have involved the use of chlorinated hydrocarbon and other insecticides, resulting in a widespread resistance of house-flies to these insecticides. Among the older methods of control the use of poison baits has been little explored. A bait containing 40 per cent. formaldehyde has proved useful, but a new bait containing TEPP promises to give a considerable degree of control. The formula for this bait is:—

1·5 to 2·5 cc. of 40 per cent. TEPP,
4 fl. oz. molasses,
1 gallon water.

TEPP is a highly toxic compound and should be used with caution. It is suggested that for fly control in dairy barns the bait should be applied from watering cans to the clean floor. All species of flies are killed by this bait but it has little residual effect since TEPP is degraded when exposed to air or water. TEPP has an action similar to that of a cholinesterase inhibitor, and a useful antidote in case of poisoning is 0·01 to 0·02 grain of atropine given every hour. *C. Mary Harrison*

TOUMANOFF, C. Contribution à l'étude des tabanidés de l'Indochine. (Troisième note: Description d'une espèce nouvelle. [**Study of the Tabanids of Indo-China. 3rd Note: Description of a New Species**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 200–205, 4 figs. on 2 pls.

WIRTH, W. W. & BLANTON, F. S. **Studies in Panama** *Culicoides* **(Diptera, Heleidae). II. Descriptions of Six Additional New Species.** *J. Parasitology.* 1953, June, v. 39, No. 3, 229–36, 6 figs. on 2 pls.

See also p. 803, HEISCH & GUGGISBERG, **Notes on the Sandflies (Phlebotomus) of Kenya.**

HOOGSTRAAL, H. (*Ornithodoros salahi* **sp. nov. (Ixodoidea, Argasidae) from the Cairo Citadel, with Notes on** *O. piriformis* **Warburton, 1918 and** *O. batuensis* **Hirst, 1929.** *J. Parasitology.* 1953, June, v. 39, No. 3, 256–63, 11 figs.

KOHLS, G. M. *Ixodes venezuelensis*, **a New Species of Tick from Venezuela, with Notes on** *Ixodes minor* **Neumann, 1902 (Acarina; Ixodidae).** *J. Parasitology.* 1953, June, v. 39, No. 3, 300–303, 1 fig.

KOHLS, G. M. **Notes on the Ticks of Guam with the Description of** *Amblyomma squamosum* **n.sp. (Acarina; Ixodidae).** *J. Parasitology.* 1953, June, v. 39, No. 3, 264–7, 1 fig. [10 refs.]

FOX, I. **Notes on the Cat Flea in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1953, Mar., v. 2, No. 2, 337–42, 4 figs. [16 refs.]

The following is taken from the author's summary :

"Evidence is brought forward to show that *Ctenocephalides canis* (Curtis) does not occur in Puerto Rico, the species involved being *C. felis* (Bouché). This evidence is based on surveys of rats and dogs and on a re-examination of the published records. It is likely that the same situation exists in other places from which the dog flea has been reported."

JAMESON, F. W., Jr. & SASA, M. *Trombicula* (*Trombiculindus*) *kansai*, **a New Chigger from Central Honshu, Japan.** *J. Parasitology.* 1953, June, v. 39. No. 3, 247–9, 1 fig.

LOCKARD, D. H. & FISK, F. W. **A Turntable Modification of the Peet-Grady Method.** *J. Econom. Entom.* 1953, Feb., v. 46, No. 1, 20–24. [14 refs.]

One of the disadvantages of the standard Peet-Grady test method, in regard to residual insecticides, is the difficulty of thoroughly decontaminating the chamber after each test. The following method was introduced to avoid this trouble. Instead of being free to fly inside the chamber, the house-flies are confined in 4 wire-mesh cages, 5 inches in diameter and 8 inches high of 16-mesh galvanized wire. These are placed on a turntable 48 inches in diameter which can be rotated at speeds up to 20 r.p.m. After each test the cages can be decontaminated by heat (150–170°C. for 24 hours). In other respects the tests are conducted in the standard way.

The amounts of spray mist picked up by batches of flies were estimated by adding thymolphthalein to the liquid and making colorimetric determinations. These experiments showed:

(a) That the pick-up of spray by the flies increased as the speed of rotation of cages was raised.

(b) Sprays containing pyrethrins caused activation and therefore higher pick-up than sprays without.

(c) The replication of pick-up in different cages showed small variation compared with large differences observed in separate groups from one normal Peet-Grady test.

(e) The 24-hour median lethal concentrations of certain insecticides included the following results (percentages): dieldrin 0·017; parathion

0·02; lindane 0·046; heptachlor 0·052; aldrin 0·056; TEPP 0·069; chlordane 0·25; DDT 0·35; malathon 0·48; toxaphene 0·68; allethrin 1·5. At these doses there was very little knock-down at 10 minutes except with allethrin. *J. R. Busvine*

METCALF, R. L. & MARCH, R. B. **The Isomerization of Organic Thionophosphate Insecticides.** *J. Econom. Entom.* 1953, Apr., v. 46, No. 2, 288–94, 1 fig. [17 refs.]

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

WATSON, M. **On Airs, Waters and Places in Malaya, India, Africa and Europe.** *J. Trop. Med. & Hyg.* 1953, May, v. 56, No. 5, 99–103.

——. **Some Impressions, Past and Present, of Mice and of Men and of Government Departments.** *Ibid.*, June, No. 6, 133–9.

In this Presidential Address to the Surrey Branch of the British Medical Association, Sir Malcolm Watson draws on more than 50 years' experience of public health activities, particularly in the field of tropical hygiene to which he has himself made so many notable contributions. His reminiscences touch on a wide range of subjects from Hippocrates *via* tropical fevers to the National Health Service in Britain.

In the first part of the address, the author discusses medical conditions in Asia and Africa at the beginning of the century and refers briefly to his own well-known malaria control work in Malaya, in tea gardens in Assam and in the Copper Mines of Northern Rhodesia. He then makes some historical digressions on early medicine in Europe, the virtual disappearance of plague and smallpox, and the gradual conquest of infection by the development of antiseptics, bactericidal drugs and antibiotics. Reference is made to the 19th century pioneers of public health and tropical medicine and the debt is acknowledged to others, such as engineers, builders, and traders who have contributed to public health developments. The importance is stressed of " wise economy " in the use of funds for health work, so that the best results may be obtained with a minimum of cost.

The second part of the address is largely devoted to criticism of some aspects of administrative machinery which the author has conceived to be unfavourable to public health progress and about which he has some hard things to say. He then discusses the development of the National Health Service and is frankly critical of many aspects of it. The address concludes with some thoughts on the present and future state of medicine and a plea for the fullest opportunities for participation by individual doctors in increasing numbers in promoting the health of the people: the final note in the author's robust address is a call for a " *Magna Carta Medicorum* ".

H. J. O'D. Burke-Gaffney

WOODRUFF, A. W. **The Prevention of Disease in the Tropics.** *Trans. Ass. Indust. Med. Officers.* 1953, Jan., v. 2, No. 4, 158–62. [10 refs.] Discussion 162–3.

This paper, read to the Association of Industrial Medical Officers, gives a general account of the precautions to be taken to avoid disease in the tropics. The author, who is Wellcome Professor of Clinical Tropical

Medicine, London University, deals at some length with vaccination against some of the commoner infectious diseases of warm climates and the nature of and regulations concerning such vaccinations. There is a useful account of the sequence in which vaccinations may be given and of the vaccination of children in relation to their age, based on the table given by MURRAY [*Bulletin of Hygiene*, 1948, v. 23, 909].

Travel sickness and its treatment are mentioned and there is a full discussion of the merits and drawbacks of various drugs in the prophylaxis of malaria, in which the author makes a sound case for 100 mgm. of proguanil daily.

There are brief notes on the prevention of trypanosomiasis, filariasis, food-borne diseases and those helminthic infections contracted by exposure of the skin to water. The author then refers to the effects of climate, and the need in the hottest weather to avoid heat exhaustion by means of a daily intake of salt from all sources of a total of 45 gm.

The paper was followed by a discussion, and its interest for its listeners is evident from the variety of questions put to and answered by the speaker: the subjects raised include protection of the skin, selection of persons for tropical service, protection of food and drink, loss of weight and anti-malaria precautions.

This paper brings together in a useful form the sort of practical information which is required by those contemplating travel to the tropics and by those responsible for advising others so situated. [The printers have, not inappropriately, described the author as the "Welcome" Professor of Clinical Tropical Medicine, University of London.]

H. J. O'D. Burke-Gaffney

HOEPPLI, R. **The Role of Parasites in Medicine before the Development of Modern Parasitology.** *Proc. Alumni Ass. King Edward VII. College of Med.* Singapore. 1952, Dec., v. 5, No. 4, 297–320, figs. 2–5. [45 refs.]

This article is a collection of brief descriptions of the references to the real and imaginary parasites of man to be found in the writing and graphic arts of the various civilizations of the ancient times up to the middle of the 17th century. The Chinese, Egyptian, Assyrio-Babylonian, Graeco-Roman, Indian [Asian], Hebrew, Arabian, and European civilizations are considered.

Brief reference is then made to the period from the middle of the 17th to the middle of the 19th centuries, when ill-formed doctrine and superstition were gradually displaced by a more rational approach founded on more detailed observation made possible by the microscope, and encouraged by the parallel development of the disciplines which occurred in the physical sciences at this time.

W. E. Kershaw

HORNER, W. H. & HORNER, Marjorie C. **Urinary Calculi among Negroes of Belgian Congo, Africa.** *J. Urology.* 1952, Dec., v. 68, No. 6, 929–32, 2 figs.

"Contrary to the belief generally held that the Negro is immune to urinary calculi, our experience in the central Equatorial region of the Belgian Congo has shown that this is a common disease in our area.

"Among 403 patients treated with major surgical conditions during a 2-year period 18 or 4.46 per cent. were cases of urinary bladder calculi. The

total number of hospital and dispensary admissions during the same period was 8,000. One patient in 444 admissions suffered from bladder stones.

"The incidence of urinary lithiasis will probably be found to be even greater than we have observed when more facilities for making an accurate diagnosis become available."

GERRITSEN, T. & WALKER, A. R. P. **Serum Iron and Iron-Binding Capacity in the South African Bantu.** [Correspondence.] *Nature.* 1953, Apr. 18, v. 171, 699.

Serum iron and iron-binding capacity have been determined in groups of adult Bantu from different regions of South Africa. The male groups (14 subjects) from the Johannesburg area, healthy or suffering from complaints unlikely to influence serum iron, showed somewhat elevated serum iron values. Of the groups from other areas, containing only males passed as medically fit for service in the gold mines, that from Mozambique, Angola and Nyasaland (68 subjects) was significantly higher in serum iron and iron-binding capacity than the group from Pondoland, N. Transvaal (Bapedi) and Tanganyika, for which the values were normal.

Several of the elevated values obtained for serum iron and iron-binding capacity were higher than any reported for such diseases as idiopathic haemochromatosis or transfusional siderosis. Among the Pondos and Bapedi a few very low values were obtained, which were, however, consistent with normal haemoglobin levels. *J. H. Birkinshaw*

LOUIS, L. A. & CHARLES, P. Contribution à l'étude de la fonction hépatique chez le noir africain. VIII. Temps de Quick et taux de prothrombine. [**Study of Liver Function in Africans. VIII. Prothrombin Time and Prothrombin Levels**] *Ann. Soc. Belge de Méd. Trop.* 1953, Feb. 28, v. 33, No. 1, 47–51, 2 graphs.

The following is a translation of the authors' summary:—

The authors found a mean prothrombin level of 77·9 per cent. in 202 apparently healthy Africans. They consider that further studies are necessary to determine the exact origin of this hypoprothrombinaemia.

H. J. O'D. Burke-Gaffney.

MONTESTRUC, E. Considérations sur les fausses réactions sérologiques de la syphilis chez les Antillais. [**Observations on False Positive Reactions in Serological Tests for Syphilis in the Antilles**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 180–84.

BOOK REVIEWS

CHATTERJEE, K.D. [M.D. (Cal.)]. **Human Parasites and Parasitic Diseases for Students, Laboratory Workers, Practitioners of Medicine and Public Health.** pp. viii + 766, 328 figs. (82 coloured). 1952. Calcutta–26: 6, Amrita Banerjee Road, Kalighat, India. [£6; $16.75.]

It is with great pleasure that one welcomes a new work on parasitology; few enough exist and there is room for a more extended treatment of the subject. Brumpt's "Précis", Craig and Faust's "Clinical" (and others

from the New World), Blacklock and Southwell's " Guide ", and Pavlovsky's " Parasitology " all treat the subject in a highly individual fashion, and in Chatterjee's there has arisen a work unique in two ways: (1) in the variety and beauty of its coloured illustrations, and (2) in the detail of the Indian aspects of the subject.

The book is simply arranged: there is a short introductory chapter dealing with general principles, nomenclature, methods of diagnosis, and modern chemotherapy; then the book is divided into two sections—protozoology and helminthology. Both these subjects are treated on similar lines—each parasite is considered under the following headings: historical, geographical distribution and incidence, habitat, morphology, life cycle, pathology, clinical features, diagnosis, treatment and prophylaxis. The more important infections are described in great detail—nearly a 100 pages are devoted to *Entamoeba histolytica*, the same to the leishmaniae, nearly 200 to malaria parasites, and 150 to the nematodes. Profuse references follow each chapter. There is a short concluding chapter on Anthelmintics for intestinal helminthiasis. It is rather difficult to understand why the author thought it was necessary to add this chapter—modern chemotherapy for helminthiasis is well summarized in another part of the volume, and the subject is treated in much detail under the individual diseases. And if there has to be a special chapter on anthelmintics, then the provision of a separate one dealing with modern chemotherapy in protozoal infections might be considered even more desirable, considering the strides the subject has made in recent years. The historical sections are of considerable interest and illustrate the great age and continuity of some of our remedies, *e.g.*, it is recorded how tapeworm and its cure by pomegranate root bark were described as long ago as 1550 B.C. in the Ebers papyrus, and fresh treatments have been introduced every century or so since that time with the exception of the period between the 11th and 16th centuries—the so-called " Dark Period of Medical Helminthology ".

The accounts of all the important diseases are accompanied by vivid figures of the life cycle; and in addition differential characters are well summarized in special tables or illustrated in line drawings. Other diagrams show the action of drugs, etc. and one of the most useful of these is that showing the action of various antimalarial drugs on the different phases of the cycle. These features make the book particularly valuable to students, who will equally appreciate the magnificent coloured plates of macroscopic and microscopic pathology. The colours themselves are remarkably accurate, particularly in respect of sections stained with haematoxylin and eosin, while pictures like the macroscopic appearance of the spleen and brain in malaria —usually so difficult to illustrate—are life-like in their representation.

Each disease is described clearly, comprehensively and very much from the practical standpoint of the clinician or clinical pathologist; it is easy therefore to go direct from the book to the patient, without having to look up details of technique elsewhere. One may not agree with all the author's remarks—like " Aldehyde test has become the most generally useful test in the diagnosis of kala-azar " or the " course of each febrile paroxysm [in ovale malaria] is short and mild ", but in a book of this scope, individual expressions of opinion are inevitable.

The title of the book is not entirely appropriate—a more accurate one would be Medical Protozoology and Helminthology with particular reference to Asia. The descriptions of Indian conditions have obviously come red-hot from the bedside or laboratory; the accounts of African or South American diseases are much shorter and inevitably do not possess that eye-witness accuracy so much a feature of the former. The chapters dealing with diseases

like sleeping sickness, Chagas's disease or onchocerciasis are thus not so satisfactory as those describing kala azar or elephantiasis. This criticism could be remedied in the next edition by collaboration or consultation with teachers from outside Asia. This is the only serious criticism—the next relate to what are obviously deliberate omissions: there is no bacteriology, no virology, no entomology and practically no hygiene. The title might lead one to expect to find these subjects, which are often described in full in the classical books on the subject. Minor omissions are toxoplasmosis and sarcosporidiosis, which might as well be mentioned considering that all the rarer flukes have found a place.

Workers in Asia will hardly be able to do without this book; workers elsewhere will find in it a novel and interesting account of the subject.

P. C. C. Garnham

HOPKINS, G. H. E. [O.B.E., M.A., F.R.E.S.]. **Mosquitoes of the Ethiopian Region. I. Larval Bionomics of Mosquitoes and Taxonomy of Culicine Larvae.** With Notes and Addenda by P. F. MATTINGLY. 2nd Edition. pp. viii+355, 211 figs. 1952. London: British Museum (Natural History), Cromwell Road, S.W.7 & B. Quaritch, Ltd. [45*s*.]

[Readers of this *Bulletin* may know that this book is the first of 3 parts, which were originally published before the late war [this *Bulletin*, 1936, v. 33, 570] and which form the British Museum monographs on the systematics of the mosquitoes of the Ethiopian region, this term being used in the sense in which it is commonly employed by zoologists to include the whole of the mainland of Africa south of the Sahara as well as Aden and south-west Arabia, Madagascar and the adjacent smaller islands and those in the Gulf of Guinea. Experimental and control work do not come within the scope of these volumes.]

Up to 1946 Mr. Hopkins revised the whole of this part which is an account of the bionomics of mosquitoes and the taxonomy of the larvae of the culicine mosquitoes of the region. Mr. Mattingly later made revisions and additions, much of which new information has resulted directly or indirectly from researches on yellow fever. Altogether 86 more species have been added to the previous total making the present number 334; the number of figures of morphological characters has been increased from 158 to 211 and the bibliographical references from 117 to 228.

The general plan of the book remains the same with the first 32 pages containing accounts of the location of mosquito breeding places (including some *Anopheles* species), their condition and methods of recording them. There are also notes on locomotion and respiration of larvae, on methods of collection, rearing, identification and preservation, as well as a full description of the external morphology of a fourth stage culicine larva.

The rest of the work is devoted to systematics and taxonomy. The detailed descriptions of the species and the keys for identification naturally concern only fourth stage larvae. The only earlier instars mentioned are of *Aëdes aegypti*. The most helpful characters for identification are illustrated and there are some notes on breeding places. There is obviously much still to be done, for under some names are the words "larva and breeding place unknown". Nevertheless, this is the fullest account of these larvae which we have in one volume and it will be welcomed by the entomologist specializing in these mosquitoes. But there will certainly be many occasions when other interested people, both in Africa and elsewhere, will have need to consult this well-produced volume.

H. S. Leeson

Printed in Great Britain under the authority of HER MAJESTY'S STATIONERY OFFICE
by The Eastern Press, Ltd., London and Reading

(1332) Wt. P8/418 9/53 E.P. Ltd. Gp. 566.